THE SUBGENERA, SPECIES GROUPS, AND SYNONYMS OF *ANAPHES* (HYMENOPTERA: MYMARIDAE) WITH A REVIEW OF THE DESCRIBED NEARCTIC SPECIES OF THE *FUSCIPENNIS* GROUP OF *ANAPHES S.S.* AND THE DESCRIBED SPECIES OF *ANAPHES* (*YUNGABURRA*)

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The genus *Anaphes* Haliday is redescribed and classified into two subgenera: *Anaphes s.s.* and *Anaphes* (*Yungaburra* Girault). Two species groups are recognized in *Anaphes s.s.* - the *fuscipennis* group (previously *Anaphes s.s.*) and the *crassicornis* group (previously *Patasson* Walker). Three species groups are recognized in *A.* (*Yungaburra*) - the *amplipennis* group [previously *A.* (*Austranaphes* Ogloblin)], the *nitens* group (previously *Yungaburra s.s.*), and an unnamed group based on undescribed species principally from New Zealand. A phylogeny is proposed in which the subgenus *Yungaburra*, with an austral disjunct distribution, is hypothesized to be the primitive sister group and the more derived subgenus *Anaphes* occurs principally in the Northern Hemisphere.

Descriptive notes are provided for the type species of 9 of the 14 synonyms of *Anaphes*, based on study of their primary type specimens. Lectotypes are designated for *Anaphes pratensis* Förster and *Hofenederia* ***pectoralis*** Soyka. The following new synonymies are proposed: *A. ranalteri* (Soyka) and *A. lacensis* (Soyka) under *A. medius* Soyka; *A. pinguicornis* (Soyka) under *A. pectoralis* (Soyka); *A. capitulata* (Soyka), *A. filicornis* (Soyka), *A. maculata* (Soyka), *A. neopratensis* (Soyka), and *A. stammeri* (Soyka) under *A. fuscipennis* Haliday; *A. lemae* Bakkendorf under *A. flavipes* Förster; and *A. neuquenensis* Ogloblin under *A. pucarobius* Ogloblin. Keys are given to the subgenera and species groups of *Anaphes*. The 9 described Nearctic species of the *fuscipennis* group are reviewed and keyed. The 6 descibed species of *A.* (*Yungaburra*) are keyed. One new species, *A.* (*Anaphes*) *byrrhidiphagus*, is described. A checklist of 250 nominal species of *Anaphes* is given, 16 of which were previously assigned to other genera. Two species are removed here from *Anaphes* to *Erythmelus* Enock, as new combinations: *Erythmelus harveyi* (Girault) and *E. tingitiphagus* (Soares). *Anaphes foersteri* Ratzeburg is provisionally assigned to *Anagrus* but its true placement may never be determined because its type specimen(s) were destroyed.

Résumé *Proc. ent. Soc. Ont.* 123:23-110

Le genre *Anaphes* est redécrit et classifié en deux sous genres: *Anaphes s.s.* et *A.* (*Yungaburra*). Deux groupes d'espèces sont reconnus a l'intérieur d'*Anaphes s.s*, le groupe *fuscipennis* (préalablement *Anaphes*) et le *groupe crassicornis* (préalablement *Patasson*). Trois groupes d'espèces sont reconnus a l'intérieur d'*A.* (*Yungaburra*) - le groupe *amplipennis* (préalablement *Austranaphe*), le groupe *nitens* (préalablement *Yungaburra s.s.*), et un groupe sans nom basé sur des espèces non décrites principalment de la Nouvelle Zélande. Les groupes d'espèces à l'intérieur de chaque sous genre sont séparable dans les femelles seulement, selon le nombre d'articles de la massue. Une phylogénie est proposée dans laquelle *Yungaburra*, avec une distribution disjoncte Australe, est considerée comme le sous genre ancestral et le sous genre *Anaphes* plus dérivé se trouvent principalment dans l'hémisphère nord.

Des notes descriptives sont données pour les espèces types de 9 des 14 symonymes d'*Anaphes* basées sur l'étude de leurs types primaires. Des lectotypes ont été désignés pour *Anaphes pratensis* Förster et *Hofenederia* ***pectoralis*** Soyka. Les synonymes nouveaux suivants sont proposés: *A. ranalteri* (Soyka) et *A. lacensis* (Soyka) sous *A. medius* Soyka; *A. pinguicornis* (Soyka) sous *A. pectoralis* (Soyka); *A. capitulata* (Soyka), *A. filicornis* (Soyka), *A. maculata* (Soyka), *A. neopratensis* (Soyka,) et *A. stammeri* (Soyka) sous *A. fuscipennis* Haliday; *A. lemae* Bakkendorf sous *A. flavipes* Förster; et *A. neuquenensis* Ogloblin sous *A. pucarobius* Ogloblin. Nous présentons des clés aux sous genres et groupes d'espèces d'*Anaphes*. Les 9 espèces Néarctiques décrites du group *fuscipennis* sont revues et une clé est présentée. Une clé est presentée pour distinguer les 6 espèces décrites d'*A.* (*Yungaburra*). Une nouvelle espèce, *A. byrrhidiphagus*, est décrite. Une liste de 250 espèces nominales d'*Anaphes* est donnée, 16 desquelles ont été placé dans d'autres genres. Deux espèces sont enlevées d'*Anaphes* et placées dans des combinaisons nouvelles: *Erythmelus harveyi* (Girault) et *E. tingitiphagus* (Soares). *Anaphes foersteri* Ratzeburg est provisoirement placé dans *Anagrus* mais son emplacement réel probablement ne sera jamais déterminé parce que les spécimens types ont été détruit.

Introduction

The genus *Anaphes* is one of the more speciose genera of Mymaridae, containing 231 nominal species (checklist p. 72). Members of the genus are egg parasites mainly of Curculionidae and Chrysomelidae, but there are literature reports, some of doubtful accuracy, of *Anaphes* species parasitizing members of 17 additional families of insects (Huber 1986). Four species of *Anaphes* have been used, sometimes successfully, for the biological control of important agricultural and forestry pests in several countries (Clausen 1978; Huber 1986) and there is continued interest in using other members of this genus in more biological control programs (Boivin 1986; Collins and Grafius 1986; Aeschlimann 1986; Jackson 1986; Aeschlimann *et al.* 1989; Dysart 1990). The result has been a relatively large volume of applied literature on at least seven species of the genus.

Unfortunately, for reasons discussed below, specific names used in the biological literature are sometimes incorrectly applied to the species studied.

Despite their proven importance in biological control, the taxonomy of *Anaphes* is in a very poor state. Most species are unrecognizable from the descriptions alone, there are no recent revisions of the genus, and species identification is difficult so that relatively few species are correctly identifiable using existing keys. In addition, one species, *A. iole* Girault, has been reared from two different hosts and significant host-induced morphological variation was obtained (Huber and Rajakulendran 1988), thus adding another complication to species recognition and definition. In contrast, many species appear to be so similar that they cannot be distinguished reliably using morphological characters alone. A thorough re-evaluation of previously described species is therefore needed.

The purpose of this paper is to review the infrageneric groups of *Anaphes* worldwide, to redescribe, illustrate, and key the previously described North American species of the *fuscipennis* group so as to make them identifiable, and to review the described species of *A.* (*Yungaburra*). Although there are clearly many undescribed species of *Anaphes* it seems pointless at this stage in our knowledge of the taxonomy of the genus to describe them unless accurate host records are available and/or there is a real need to publish a new scientific name. In the single instance where I describe a new species it is because specimens were reared from known hosts, a good series of specimens was available for study, and the species was morphologically quite distinct from any previously described species.

Methods

Approximately 3000 pinned or slide mounted specimens were examined during this study. The types of each species discussed were examined unless otherwise indicated. The method of preparing specimens, discussion of terms used and measurements made follow Huber (1987, 1988). Terms which were not discussed previously are the marginal and medial spaces ("Marginalraum" and "Medialraum" of Soyka, 1949), defined here as the two, usually distinct, hairless areas of the fore-wing blade in front of the cubital row of microtrichia (Figs. 6, 7, 20-36). Measurements are given in micrometers (µm), with the mean followed, in parentheses, by the range and number of specimens measured. Measurements of primary types are given in Appendices I and II. Abbreviations used in the descriptions are: F = funicular article; T = abdominal tergite; FWL, FWW, HWL, HWW, LMC = fore wing length and width, hind wing length and width, and longest marginal cilia, respectively. Many of the specimens studied were preserved for varying periods of time in alcohol before being point- or slide-mounted and consequently are often somewhat faded. Therefore, the colour given in the descriptions is often not quite accurate. In life the specimens may be darker in colour than described.

This study is based on specimens loaned from the following institutions:

BMNH - The Natural History Museum, London. J.S. Noyes.
CISC - University of California, Berkeley. L.E. Caltagirone.
CNCI - Canadian National Collection of Insects, Ottawa. J. Huber.
CUIC - Cornell University, Ithaca. J.K. Liebherr.
DEBU - University of Guelph, Guelph. S. Marshall.
EMUS - Entomological Museum, Utah State University, Logan. G.E. Bohart.
INHS - Illinois Natural History Survey, Urbana. K.C. McGiffin.

LACM -	Los Angeles County Museum of Natural History, Los Angeles. R.R. Snelling.
MLPA -	Museo de la Plata, La Plata. R.A. Ronderos.
MHNG -	Muséum d'Histoire Naturelle de Genève, Geneva. C. Besuchet.
MZUF -	Museo Zoologico de "La Specola", Florence. S. Mascherini.
NHMW -	Naturhistorisches Museum Wien, Vienna. M. Fischer.
NMID -	National Museum of Ireland, Dublin. J.P. O'Connor.
OSUO -	Oregon State University, Corvallis. P. Hanson
PMAE -	Provincial Museum of Alberta, Edmonton. A.T. Finnamore.
ROME -	Royal Ontario Museum, Toronto. C. Darling.
UCRC -	University of California, Riverside. J. Hall.
UICM -	University of Idaho, Moscow. F.W. Merickel.
USNM -	United States National Museum, Washington. M.E. Schauff.
ZMUC -	University of Copenhagen, Copenhagen. B. Petersen.

Historical Review

The nomenclatural history of *Anaphes* is well discussed and summarized by Debauche (1948), Annecke and Doutt (1961), Graham (1982), and Schauff (1984a), so is not repeated here. Not all problems have yet been resolved, however. As pointed out by Graham (1982: 204), *Ichneumon punctum* Shaw, established as type species of the genus *Anaphes* in ICZN Opinion 729 (China 1965), cannot be identified. *A. fuscipennis* Haliday was treated as the type-species of *Anaphes* by some earlier workers, e.g., Ashmead (1904), Debauche (1948, 1949), and Hellén (1974). It would be useful if the previous designation of *I. punctum* as type-species were set aside by the International Commission on Zoological Nomenclature and *A. fuscipennis* were to be adopted as the type-species of the genus, as recommended by Graham (1982).

Anaphes is a very homogeneous genus although past workers attempted to classify the species into numerous genera or subgenera. Most workers currently recognize only one genus with at most two subgenera.

Of the 231 nominal species included here in *Anaphes* about 66% (153) were described from Europe by Soyka (1946a, 1946b, 1949, 1950, 1953a, 1953b, 1954, 1955). Soyka divided the species among nine genera which were explicitly or implicity synonymized under *Anaphes s.l.* by later workers. Debauche (1948) and Soyka (1949, 1953b) keyed Belgian species and most of the European species, respectively. Hellén (1974) keyed the species of Finland. Tryapitzin (1978) provided a Russian translation of Debauche's keys which was subsequently translated into English (Tryapitzin 1987). Species described from regions other than Europe include 18 from North America, five from South America (four keyed in Ogloblin 1962), eight from Australia, three from Africa, and one from Japan.

The North American species of *Anaphes* were catalogued as two genera, *Anaphes* and *Patasson*, by Burks (1979). Ten of the species considered native to the continent were described by Girault (1905, 1909, 1910, 1911e, 1916, 1929). Three Palaearctic species were accidently (*A. fuscipennis*) or intentionally (*A. luna*, *A. flavipes*) introduced from Europe into North America for biological control of agricultural pests (Clausen 1978; Huber 1986). Attempts have been made to establish a fourth species, *Anaphes diana* Girault, from Europe (Yeargan and Shuck 1981). Girault (1910, 1911e, 1929) provided keys to the North American species but they are incomplete and difficult to use. Doutt (1949) provided a key to the species of *A.* (*Patasson*) (as *Anaphoidea*).

Problems in Species Recognition

I cannot place confidently under existing species names several hundred point- or slide-mounted specimens of the total number that I examined. Many of these may represent undescribed species but I do not describe them here for two reasons.

First, intraspecific variation occurs which cannot easily be distinguished from interspecific differences. Some species of *Anaphes* are known to produce more than one parasite from a single host egg (multiparasitism). The size of these parasites can vary considerably depending on how many develop per egg. Very small specimens may not be identifiable, unless associated by rearing with larger individuals from the same egg. Also, as mentioned above, host induced structural variation occurs in *Anaphes iole* Girault (Huber and Rajakulendran 1988). Because discontinuous variation is possible in at least one *Anaphes* species, and may occur in other species of *Anaphes* for which hosts are still unrecorded, great care must be taken in describing new taxa. Cross-breeding experiments in which *Anaphes* reared from one host are transferred to others and the morphology of the specimens reared from the different hosts is compared would be very useful in helping to elucidate species limits and amount of intraspecific variation possible. Attributes that appear to separate the described species often are very minor and difficult to describe adequately. These differences may only represent infraspecific variation but because of lack of biological information and sufficiently long series for study it is often not possible to distinguish interspecific from intraspecific variation.

Second, numerous species, most of which are not identifiable with any confidence using the existing literature, have been described from Europe. Quite probably, many of these names will be synonymized under one another. It is necessary that the nominal taxa be adequately studied, using large amounts of fresh, well prepared material for comparison with the types, and infraspecific variation be taken into account, before any species are described from North America. Otherwise, it is likely that at least some of the species described from North America will be the same and will eventually have to be synonymized.

In consequence, I see little point in describing new species of *Anaphes* unless required to provide a name for an economically important species because so many of the previously described species remain unidentifiable.

Distribution

The genus *Anaphes* is worldwide but species and numbers of individuals appear to be much more numerous in temperate and cold areas (i.e. higher latitudes) compared with the tropics. The genus appears to be poorly represented in the Afrotropical region. The greatest structural diversity occurs in the Australian region.

Maximum northern and southern collection records are, respectively: an undetermined specimen of *Anaphes* in the *crassicornis* group from Canada, NWT, Hazen Camp, 81º49'N, 70º18'W, 7.VII.1963, R.E. Leech (1♀, CNC); and *Anaphes nunezi* Ogloblin from Argentina, Tierra del Fuego, Bahía Aguirre, 54º57'S, 65º50'W, 14.II.1949, J. Núñez (1♀ and 1♂, LaPlata) (Ogloblin 1962). These two records also represent the furthermost northern and southern distribution records for the family Mymaridae. In high latitudes (beyond the tree line) the only mymarids present are species of *Anaphes* (e.g. Danks 1983) with one exception (*Notomymar*) in the southern hemisphere (Block 1992).

Biology and Economic Importance

In the family Mymaridae, several species of *Anaphes* are among the better studied biologically, mainly because of their actual or potential use in biological control of important pests. Much of the non-taxonomic literature on the genus is on relatively few species such as *A. conotracheli*, *A. diana*, *A. flavipes*, *A. fuscipennis*, *A. iole*, *A. luna*, *A. nitens* and *A. sordidatus* which have proved to be important in natural or biological control.

Anaphes species are mostly parasites of Curculionidae and Chrysomelidae, but there are a few records from other families of insects. A list of hosts, a summary of the use of several species in biological control projects of varying success, and a brief review of important papers on the biology of some of the species was given by Huber (1986). Hopkins (1978) reviewed the literature on some important species. Because Coleoptera are relatively uncommon at high latitudes where species of *Anaphes* are often common it is possible that Diptera are the main hosts there, but this is yet to be determined for certain.

Except for a few species that parasitize host eggs laid in vegetation such as plant stems, specimens of *Anaphes* are most frequently caught in pan traps. This is probably because many *Anaphes* parasitize eggs that are laid in or close to the soil. Other trapping methods are generally much less efficient in catching members of the genus.

Hurd (1954) implicated *Anaphes* sp. (as *Mymar*), among other insects, in a unique case of medical interest in which the author became ill as a result of aspirating several arthropods which infected his sinuses.

Relationships

Kryger (1934) and Debauche (1948) made the first critical analyses of *Anaphes* species and concluded that the attributes used to divide the genus were inadequate. Yet Kryger (1950) and Annecke and Doutt (1961) continued to treat *Anaphes* and *Patasson* as separate genera. Debauche (1948, 1949), Graham (1982), and Schauff (1984a) treated *Patasson* as a subgenus of *Anaphes*. All, however, agreed that the attributes used to separate *Patasson* from *Anaphes*, regardless of their hierarchical level, were not very good. Annecke and Doutt (1961) and Graham (1982) suggested that a division of *Anaphes* into subgenera was unsatisfactory because only one not-completely-reliable character was used and it applied to one sex only. Instead, they proposed that species groups would be more appropriate than subgenera for subdividing the relatively numerous species of *Anaphes*. In contrast, Soyka (1946b, 1949, 1950) subdivided *Anaphes* into several genera.

The genus is indeed very homogeneous, at least in the Holarctic region. The only way one can group the species in an almost non-arbitrary manner is by the number of flagellomeres, as was done by previous workers. Even using this character, some species may have to be arbitrarily assigned to one or other species group. Nevertheless, subgenera can still be usefully employed in *Anaphes*, though the division proposed below (Table I, Fig. 1) does not follow that used by earlier workers.

Subgenera, like genera, should reflect the evolutionary history of a group, irrespective of whether this history is expressed as morphological modifications in males or females, or both. Therefore, eliminating subgenera in *Anaphes* because the attributes used to subdivide the genus are based only on the female sex is not valid. For the most part, mymarid taxonomy, including that

TABLE I. Character matrix for species groups of *Anaphes*.

Present subgenus	Species group	Old subgenus	Female - # of club articles (# of sensory ridges on club)*	Male - sensory ridges on F1 (apparent # of flagellomeres)*
Yungaburra	unnamed	-	3 (8)	present (11)
Yungaburra	*nitens*	*Yungaburra*	2 (8) (some 6)	present (11 or 10)
Yungaburra	*amplipennis*	*Austranaphes*	1 (8)	present (11)
Anaphes	*crassicornis*	*Patasson*	2 (6)	absent (10)
Anaphes	*fuscipennis*	*Anaphes s. s.*	1 (6)	absent (10)

* The smaller number is considered to be the apomorphic state.

of *Anaphes*, is based on the female sex only. Males are generally ignored because few specific attributes occur in this sex to separate the species reliably. Nevertheless, the primary division of *Anaphes* into what are probably the two most well defined and natural groups, is based on a male character.

The evolutionary scenario proposed here to substantiate the subgenera and species groups is based on two assumptions: first, that reduction and (apparent) loss of flagellomeres represents a derived condition; second, before flagellomeres are reduced their complement of sensory ridges and setae is gradually lost. All flagellomeres in male antennae have at least one sensory ridge, unlike female antennae where sensory ridges are often reduced in number or absent from one or more flagellomeres.

I consider the primary division separating groups within *Anaphes* to be the apparent reduction from 11 to 10 flagellomeres in males. This apparent reduction in number has occurred by a gradual shortening of F1 with loss of sensory ridges and setae until F1 is, effectively, gone (Figs. 14, 16-18, 59, 60). In fact, there are 11 flagellomeres in all *Anaphes* species but reduction of F1 makes it appear that many species have only 10 flagellomeres. The important distinction is whether 11 or 10 flagellomeres in males have sensory ridges, i.e., whether F1 has one or more sensory ridges, or none. There is good evidence for this proposed transformation series. In many, mostly undescribed, species e.g., of the *amplipennis* and *nitens* group of species, F1 has the normal complement of sensory ridges and is almost as long as other flagellomeres (Figs. 15, 19). Thus, males clearly have 11 flagellomeres. Males of *A. nitens* (Girault), *A. inexpectatus* Huber and Prinsloo and *A. tasmaniae* Huber and Prinsloo have F1 very short (slightly wider that long), much shorter than any of the remaining flagellomeres, with one seta and one transverse sensory ridge (Figs. 18, 59). In other species, all belonging to *Anaphes s.s.*, there is a remnant of F1 which has one or two setae but no sensory ridge. This anelliform remnant is perhaps most noticeable in, e.g., *A. acutiventris* (Soyka) and *A. fuscipennis* (Figs. 16, 17) where the flagellomere is only slightly shorter than wide. In other species of *Anaphes s.s.* it is even shorter but a seta always seems to be present. These species therefore appear to have only 10 flagellomeres. Debauche (1948: 154) enumerated such anelliform flagellomeres in males and I agree with this practice. Therefore, as

mentioned above, all male *Anaphes* have 11 flagellomeres even though superficial examination of a male antenna of all species of *Anaphes s.s.* would suggest that only 10 flagellomeres are present.

In females there are always six funicular articles, and a club of one to three articles. Species with a club of three articles only occur in the Australian region. The club bears either 8 or 6 sensory ridges. F1 is always the shortest and never (? or rarely) bears sensory ridges. In the *amplipennis* and un-named groups of species F1 is longer than usual, more approximating the length of the remaining funicular articles (Figs. 11, 13).

If one accepts the primary division of *Anaphes* into subgenera based on presence or absence of at least 1 sensory ridge on F1 (11 or apparently 10 flagellomeres) in males, then any other character one examines will be found to be convergent in some species. For example, Debauche (1948) gave some attributes other than the divided versus entire club in females to separate *Anaphes s.s.* from *A.* (*Patasson*). These are (translated from French): *Anaphes s.s.* "includes generally larger species, with wider wings, tarsus with longer, often unequal, articles and, in females, the basal forward-produced ovipositor sac usually poorly developed; males generally have longer, more slender antennal articles". All these differences are relative and intergrade continuously among members of the two subgenera. The only attribute that I found as a useful complement to the antennal characters is the relatively longer basal anterior prolongation of the ovipositor (Fig. 69) in the *crassicornis* group which can help decide species group placement when the female club appears to be only partly divided or is not clearly visible.

The two subgenera treated here are further subdivided into five species groups. A classification of five subgenera would also be a possibility, but would connote undue structural diversity within the genus relative to other genera of Mymaridae. Although species groups are proposed here, four of the five groups have previously been proposed as genera or subgenera. Because tradition dies hard, biologists may prefer to continue using well known generic names such as *Patasson* for some of these groups, but a predictive, formal classification should have only a single set of names or else confusion and lack of nomenclatural stability result. Therefore, I would discourage use of such names.

The two fossil species of *Anaphes*, *A. splendens* Meunier and *A. schellwieniens* Meunier, described from oligocene amber (Meunier 1901) may not belong to this genus. The illustration of the fore wing of *A. splendens*, at least, certainly does not resemble the wing of any extant *Anaphes* species. I have not seen the type specimens and do not know where these two species would best be classified.

Four autapomorphies can be used to define *Anaphes*, three of the fore wing and one of the male genitalia. They are: the presence of a single dorsal seta on the fore wing blade just apical to the frenum (Fig. 6); the presence of marginal and medial spaces on the fore wing (Figs. 6, 7, 20-36); the asymmetrical lozenge-shaped margin of the apex of the fore wing (Figs. 20-36); and the male genitalia which are exposed ventrally, situated in a groove between the apical sternites which surround it laterally and dorsally (Figs. 5, 73-76). The wing apex asymmetry is not well defined in many members of *A.* (*Yungaburra*) (Fig. 8) and some species of *A.* (*Yungaburra*) appear to lack marginal and medial spaces, or have very small ones (Fig. 8). A cladogram of proposed relationships is given in Fig. 1. The number of club articles and the number of sensory ridges on the club of females is homoplasious. In the *nitens* group the three species with a very short F1 bearing only 1 sensory ridge also have only 6 sensory ridges on the club whereas the species of the *amplipennis* and unnamed groups have a longer F1 with several sensory ridges and 8 sensory ridges on the club. This would suggest that the *nitens* group is perhaps the most advanced within *A.* (*Yungaburra*), except that it has two instead on one club articles.

Although *Anaphes* is certainly monophyletic its relationship to other genera is not yet clearly determined. Schauff (1984a) placed *Anaphes* close to *Erythmelus* on the basis of a particular kind of metasomal attachment to the mesosoma. Viggiani (1988) placed *Anaphes* close to *Richteria* Girault on the basis of similar male genitalia. Noyes and Valentine (1989) proposed that *Anaphes* is most closely related to an undescribed genus (genus B) from New Zealand. I believe that the sister genus to *Anaphes* will certainly be found in the Australian region and probably in New Zealand as Noyes and Valentine (1989) suggested but I have no further information to add since their publication. Further study of the group of genera included by Noyes and Valentine (1989) in subgroup "d" of their *Anaphes* group is needed to resolve the relationships of *Anaphes*.

Taxonomy

Anaphes Haliday

Anaphes Haliday 1833: 346; Walker 1846: 50; Schmiedeknecht 1909: 499; Girault 1911e: 287; Gahan and Fagan 1923: 12; Hincks 1944: 38; Soyka 1946b: 180; Debauche 1948: 154; Gahan 1949: 204; Kryger 1950: 39; Debauche 1949: 63; Soyka 1955: 460; Annecke and Doutt 1961: 26; China 1965: 82; Viggiani 1973: 273; Hellén 1974: 23; Graham 1982: 202; Schauff 1984a: 46; ICZN 1987: 45; Noyes and Valentine 1989: 26; Yoshimoto 1990: 50.

Type-species: *Ichneumon punctum* Shaw 1798: 189, by subsequent designation (Westwood 1839: 78). Fixed by ICZN, Opinion 729 (China 1965). Type specimen(s): lost, and unrecognizable from original description. (See discussion above regarding formal designation of a new type species).

Panthus Walker 1846; 50; Gahan and Fagan 1923: 103; Kryger 1950: 81; Soyka 1955: 460 (as *Pantjus*, misspelling); Graham 1982: 202.

Type-species: *Panthus crassicornis* Walker 1846: 52, by subsequent designation (Gahan and Fagan 1923: 103). Type specimen: lectotype ♀ (NMDI) designated by Graham (1982) [not examined]. Synonymized formally by Graham (1982) (already treated as synonym, in part, of *Anaphes* by Debauche (1948: 154, 1949: 63). Member of *crassicornis* group.

Patasson Walker 1846: viii; Girault 1910: 246; Kryger 1934: 507; Ogloblin 1939: 144; Debauche 1948: 156; Debauche 1949: 64; Kryger 1950: 84; Hincks 1960: 213; Annecke and Doutt 1961: 21; Viggiani 1973: 273; Graham 1982: 210; Schauff 1984a: 48.

Type-species: *Panthus crassicornis* Walker 1846: 52, by monotypy. Type specimen: lectotype ♀ (NMID) designated by Graham (1982) [not examined]. Synonymized under *Anaphes* by Debauche (1948: 154). Member of *crassicornis* group.

Flabrinus Rondani 1877: 180; Gahan and Fagan, 1923: 65; Hincks 1944: 38; Debauche 1948: 233; Gahan 1949: 205; Annecke and Doutt 1961: 37; Bouček 1974: 252; Graham 1982: 204.

Type-species: *Flabrinus fabarius* Rondani, by monotypy. Type specimen: lectotype ♀ (MZUF) designated by Bouček (1974) [examined]. Synonymized under *Anaphes* by Bouček (1974: 248). Member of *crassicornis* group.

Anaphoidea Girault 1909: 167; Girault 1910: 246; Gahan 1927: 31; Girault 1929: 11; Kryger 1934: 507; Ogloblin 1939: 144; Doutt 1949: 155; Soyka 1946a: 41; Soyka 1955: 460.

Type-species: *Anaphoidea sordidata* Girault, by original designation. Type specimen: holotype ♀ (INHS) [examined]. Synonymized under *Patasson* by Kryger (1934: 84). Member of *crassicornis* group.

Clinomymar Kieffer 1913: 100; Gahan and Fagan 1923: 36; Debauche 1949: 64 (as *Clynomymar*, misspelling).

Type-species: *Clinomymar peyerimhoffi* Kieffer, by monotypy. Type specimens: syntype ♀♀ (?MHNP) [not examined]. Synonymized under *Anaphes* by Debauche (1949: 63). Member of *crassicornis* group.

Yungaburra Girault 1933: 5; Ogloblin 1939: 144; Annecke and Doutt 1961: 22; Soyka 1949: 419.

Type-species: *Anaphoidea nitens* Girault, by original designation. Type specimens: lectotype ♀ Museum of Victoria, Abbotsford designated by Huber and Prinsloo (1990) [photograph examined]. Synonymized (implicitly) under *Patasson* by Annecke and Doutt (1961: 22). Member of *nitens* group.

Mymar sensu Soyka 1946b: 180; Gahan 1949: 204; Soyka 1955: 460, misidentification.

Synanaphes Soyka 1946b: 181; Annecke and Doutt 1961: 19; Graham 1982: 204.

Type-species: *Synanaphes ranalteri* Soyka, by original designation. Type specimen: holotype ♀ (NHMW) [examined]. Synonymized under *Patasson* by Annecke and Doutt (1961: 19). Member of *fuscipennis* group.

Ferrierella Soyka 1946b: 182; Annecke and Doutt 1961: 19; Graham 1982: 204.

Type-species: *Ferrierella neopratensis* Soyka, by original designation. Type specimen: holotype ♀ (NHMW) [examined]. Synonymized (implicitly) under *Anaphes* by Annecke and Doutt (1961: 19). Member of *fuscipennis* group.

Hofenederia Soyka 1946b: 183; Annecke and Doutt 1961: 22; Graham 1982: 204.

Type-species: *Hofenederia pectoralis* Soyka, by original designation. Type specimen: holotype ♀ (NHMW). Synonymized (implicitly) under *Patasson* by Annecke and Doutt (1961: 22). Member of *crassicornis* group.

Fulmekiella Soyka 1946b: 184; Annecke and Doutt 1961: 23; Graham 1982: 204.

Type-species: *Fulmekiella hundsheimensis* Soyka, by original designation. Type specimen: holotype ♀ (NHMW) [examined]. Synonymized (implicitly) under *Patasson* by Annecke and Doutt (1961: 23). Member of *crassicornis* group.

Stammeriella Soyka 1950: 120; Annecke and Doutt 1961: 19; Graham 1982: 204.

Type-species: *Stammeriella wolfsthali* Soyka, by original designation. Type specimen: holotype ♀ (NHMW) [examined]. Synonymized under *Anaphes* by Annecke and Doutt (1961: 19). Member of *crassicornis* group.

Antoniella Soyka, 1950: 121; Annecke and Doutt 1961: 23; Graham 1982: 204.

Type-species: *Antoniella stubaiensis* Soyka, by original designation. Type specimen: holotype ♀ (NHMW) [examined]. Synonymized under *Patasson* by Annecke and Doutt (1961: 21). Member of *crassicornis* group.

Mariella Soyka 1950: 123; Annecke and Doutt 1961: 23; Graham 1982: 204.

Type-species: *Mariella superaddita* Soyka, by original designation. Type specimen: holotype ♀ (NHMW) [examined]. Synonymized under *Patasson* by Annecke and Doutt (1961: 21). Member of *crassicornis* group.

Austranaphes Ogloblin 1962: 49, as subgenus of *Anaphes*.

Type-species: *Anaphes amplipennis* Ogloblin, by original designation. Type specimen: holotype ♀ (MLPA) [not examined]. Member of *amplipennis* group.

The synomyms and subgenera of *Anaphes*, with their type species, are given mostly according to Graham (1982) who discussed one of them (*Panthus*) in detail. Subsequent references, depository (where known) of the primary type specimen(s) for each type species, and method of type fixation are added here, partly following Schauff (1984a). *Anaphoides* Enock (1915: 181)

is a *nomen nudum* with no included species. Kryger (1934: 507; 1950: 86) and Ogloblin (1939: 144) discussed this name. Peck (1951: 414) designated a type species, *Panthus crassicornis* Walker, for *Anaphoides*. *Anaphoides* is not listed in the generic synonymy above because is an unavailable name. Quite possibly, *Anaphoides* was simply an inadvertent misspelling by Enock of *Anaphoidea* Girault.

Some clarification is required here concerning the gender of *Anaphes*. According to article 30(a) of the ICZN Code a Commission ruling on gender of a name must be followed. China (1965) stated that *Anaphes* was neuter and strict interpretation of the ICZN rules would require that this statement be taken as a Commission ruling on the gender of *Anaphes*. However, standard Greek dictionaries list *Anaphes* (ἀναφής), an adjective meaning impalpable as masculine and Appendix D Table 2 Part B nos. 16 and 17 of the Code give examples of the Greek -es ending as masculine. Although no previous worker has explicitly stated that *Anaphes* is masculine, they have implied that it is by selection of specific epithets which have masculine endings [except *A. punctum* (Shaw)]. Therefore, I assume that China's statement was an inadvertent mistake. In the checklist of species (p. 72) I treated *Anaphes* as masculine and changed the specific epithets correspondingly. Because many species of *Anaphes* were originally placed in genera of feminine gender several changes in agreement were required.

Diagnosis. Females. Antenna with 6 funicular articles and club of 1-3 usually tightly appressed articles separated by oblique, sometimes incomplete grooves (Figs. 9-13). Pronotum entire (Figs. 2, 58, 63). Dorsellum distinct, rhomboidal (Figs. 2, 61, 62, 66). Propodeum sharply declivous in lateral view, not in same plane as scutellum (Figs. 63, 69), and with medial longitudinal groove (Figs. 2, 61, 62, 65). Microtrichia of fore wing unevenly distributed behind and just beyond venation, usually with 2 distinct clear spaces anterior to cubital row of microtrichia, these spaces very small or absent in many species from Australian region (Fig. 8). Fore wing with single dorsal seta basal to marginal cilia just beyond apex of frenal fold (Fig. 6). Tarsi with 4 tarsomeres. Metasoma uniformly coloured, its base not lighter than rest of metasoma, and narrowed at junction with mesosoma, with T2 (petiole) very short, ring-like (Figs. 4, 67); posterior margin of T3 often incised medially (Figs. 4, 68). Ovipositor often projected forward beneath mesosoma in a sac-like extension of the metasoma (Figs. 67, 69). Spiracle on T8 present.

Description. Female. Small to medium specimens (body length 370-1075 μm; FWL 360-1600 μm).

Colour. Body uniformly black or dark brown, rarely lighter brown; exceptionally brownish yellow (one Oriental species) or with metallic blue lustre on head and mesosoma (one Australian species). Base of metasoma same colour as remainder of metasoma. Legs and antenna, especially scape and pedicel, often slightly lighter than body, sometimes yellowish. Fore wing margined with narrow dark brown border at least in apical one third of anterior margin and apex; blade often with faint to distinct fairly uniform brown suffusion, often most noticeable basally behind venation and submarginally around remainder of blade, occasionally blade with 3 dark, distinct, cross bands (some Australian species). Hind wing blade, when tinged, uniformly so, or with fine, irregular, transverse translucent lines.

Sculpture. Head, mesosoma, scape and legs with fine and indistinct to relatively coarse and distinct, cellulate to reticulate sculpture (Figs. 51-66).

Head. Face (Figs. 3, 51, 54) flat or slightly uniformly curved, without subantennal sulcus; 1 pair of intertorular setae; 7 pairs of setae on lower face; 2 to 7 anterior supraorbital setae. Torulus much less than own diameter from transverse trabecula. Subocular sulcus absent. Malar area with 2 setae, ventral seta almost on mouth margin and slightly posterior to dorsal seta.

Labrum with 1 seta (Fig. 3). Mandible with 3 teeth (Figs. 55, 56). Vertex (Fig. 53) with 2 pairs of ocellar setae. Stemmaticum absent. Occiput (Fig. 52) entire.

Antenna with 6 funicular articles, and moderately compact club of 1-3 articles separated by complete or incomplete oblique sutures (Figs. 9-13). Radicle short, almost quadrate (Figs. 57, 58, 60). Scape with fine to coarse and more or less distinct transverse or oblique ridges or striations on inner surface (Fig. 58), finer and more longitudinal striations on outer surface (Figs 57, 60). F1 usually much shorter than F2, rarely as long as F2. Club, when entire, with 6 or 8 sensory ridges; when divided into 2 articles, with 2 sensory ridges on first article, and 4 on second; when divided into 3 articles, with 2 sensory ridges on each article. Sensory ridges of flagellomeres usually straight (Figs. 9-11, 13, 37-50) sometimes strongly curved apically (Fig. 12).

Mesosoma. Pronotum entire (Figs. 2, 61, 66). Pronotal spiracle flush with surface, about 2 times diameter of propodeal spiracle. Prosternum divided longitudinally (Fig. 64). Scutellum clearly divided into anterior and posterior parts; anterior scutellum with 1 and 1 setae, and a deep excavation posterolaterally (Figs. 2, 61, 62). Metanotum distinct, with 1 and 1 small setae lateral to dorsellum (Fig. 65); dorsellum rhomboidal, clearly separated from lateral wings of metanotum (Figs. 2, 61, 62, 65). Propodeum sharply declivous (Figs. 63, 69) with a distinct narrow longitudinal groove medially (Figs. 2, 61, 62, 65); propodeal seta usually separated from spiracle by distance shorter than between placoid sensilla of anterior scutellum (at most about 2 times diameter of propodeal spiracle). Second phragma usually weakly truncated posteriorly, sometimes slightly notched apically; at most projecting into metasoma to posterior margin of T2 (Fig. 2).

Wings. Macropterous, rarely brachypterous. Fore wing very narrow (Fig. 7) to very wide (Fig. 8) (FWL/FWW 15.7-2.2), with asymmetrical rhomboidal apex (sometimes very slight asymmetry) in which the curved apical portion of anterior margin is somewhat longer than corresponding portion of posterior margin (Figs. 7, 8, 20-36). Microtrichia of blade distributed evenly beyond venation except for marginal and medial spaces, microtrichia usually numerous on dorsal surface of marginal vein; cubital row complete, extending to base of marginal vein and often beyond (Fig. 6). Marginal and medial spaces almost absent in many Australian species (Fig. 8). One, or rarely two, setae on ventral surface of blade membrane at about level of apex of submarginal vein. Apex of frenal fold basal to marginal cilia with a distinct dorsal seta projecting posteriorly (Fig. 6). Submarginal vein with bullae apically, and 1 basal macrochaeta. Marginal vein with proximal macrochaeta subequal in length to distal macrochaeta, 0-2 marginal microchaeta between macrochaetae; hypochaeta distal to proximal macrochaeta (Fig. 6). Stigmal vein about 0.4-0.6 times length of marginal vein. Hind wing linear, often distinctly curved, with 1 anterior and 1 posterior row of submarginal microtrichia and few to many microtrichia apically on disc between these rows.

Legs. Fore tibia with up to 13 conical sensilla in 2 rows on anteroventral surface. Tarsi with 4 tarsomeres, first tarsomere of middle and hind legs as long as or longer than second tarsomere.

Metasoma. Metasoma with only 6 terga (T3-T8) conspicuous; T2 very short, ring-like, not usually visible except in slide-mounts (Figs. 4, 67); posterior margin of T3 usually incised (Figs. 4, 62, 68); T8 with spiracle (Figs. 67-70). Ovipositor and sterna basally often extended anteriorly between coxae, occasionally as far as head, apex not or very slightly exserted beyond apex of metasoma (Figs. 69, 70). Cercus with 4 setae.

Male. Antenna with 11 flagellomeres (Fig. 15); in *Anaphes s.s* and three species of *A.* (*Yungaburra*) F1 greatly reduced (wider than long) (Figs. 16-18, 59) so antenna apparently with only 10 flagellomeres (Fig. 14); each flagellomere with 4 (basal flagellomeres) to about 7 (apical flagellomeres) sensory ridges except for F1 in *Anaphes s.s.* (with 0 sensory ridges) and three

species of *A.* (*Yungaburra*) (with 1 sensory ridge). T8 without spiracle. Male genitalia completely exposed ventrally, not covered by sternites, with long parameres (Figs. 73-76).

Key to subgenera and species groups of *Anaphes*.

1 Flagellum of antenna with 11, or apparently 10, flagellomeres and without club; males 2
- Flagellum of antenna with 6 funicular articles and distinct club of 1-3 articles; females 3

2(1) Antenna apparently with 10 flagellomeres (Fig. 14) each bearing several sensory ridges, F1 small (wider than long), without sensory ridges (Figs. 16, 17). Worldwide. . . . . *A.* (*Anaphes*) (*fuscipennis* and *crassicornis* groups)
- Antenna with 11 flagellomeres, if apparently with 10 flagellomeres then F1 small (wider than long), with 1 transverse sensory ridge (Figs. 18, 59). Southern Neotropical, Australian, and southeastern Oriental regions . . . . . *A.* (*Yungaburra*) (*nitens* and *amplipennis* groups, and an unnamed group)

3(1) Club with 6 sensory ridges 4
- Club with 8 sensory ridges 6

4(3) Club entire . . . . . *fuscipennis* group
- Club partly or completely divided into 2 articles 5

5(4) Fore wing with marginal and medial spaces very small or absent; parasites of *Gonipterus* spp. (Curculionidae) . . . . . *nitens* group (part)
- Fore wing with distinct marginal and medial spaces; parasites mostly of Chrysomelidae or Curculionidae other than *Gonipterus* spp., sometimes parasites of other families . . . . . *crassicornis* group

6(3) Club entire . . . . . *amplipennis* group
- Club partly or completely divided into 2 or 3 articles 7

7(6) Club partially or completely divided into 2 articles . . . . . *nitens* group (part)
- Club partially or completely divided into 3 articles . . . . . unnamed group

Review of the described Nearctic species of the *fuscipennis group*.

Nine described species are reviewed, a reduction from the twelve listed in Burks (1979). One of the species listed therein, *A. pallipes* (Ashmead), is here transferred to the *crassicornis* group, and three were synomymized by Huber and Rajakulendran (1988). One new species is described below. Many more exist but are not described here, for reasons given above. No species of the *fuscipennis* group have been described from south of the USA so this review is, in effect, for all the described western hemisphere species.

The number of valid names in *A.* (*Anaphes*) greatly exceeds the number of valid species because of the work of W. Soyka in Europe. The number of valid species in *A.* (*Anaphes*) will undoubtedly be reduced through synonymy. This number will probably only partially be compensated by description of new species from all regions.

Key to described North American species of the *fuscipennis* group.

Females

1. F4 without sensory ridges (Figs. 9, 37) 2
- F4 with 1 or 2 sensory ridges 3

2(1) Fore wing very narrow, FWL/FWW greater than 9.5, hind margin slightly concave (Fig. 20); hind tarsomere 1 subequal to tarsomere 2 . . . . . *A. sinipennis* Girault (p. 37)
- Fore wing much wider, FWL/FWW less than 5.2, hind margin straight or slightly convex (Fig. 21); hind tarsomere 1 at least 1.6x as long as tarsomere 2 . . . . . *A. fuscipennis* Haliday (p. 38)

3(1) Head with occipital suture on each side converging medially toward and almost reaching foramen magnum (Figs. 5, 6 in Huber and Rajakulendran 1988); fore wing with posterior margin hyaline except at apex . . . . . *A. iole* Girault (p. 41)
- Head with occipital suture on each side not converging medially, more or less parallel to margin of compound eye (e.g. Fig. 52); fore wing with posterior margin usually narrowly rimmed with brown for much of its length 4

4(3) F4 with 1 sensory ridge 5
- F4 with 2 sensory ridges 6

5(4) F2 at least 4.7 times as long as wide (Fig. 38) . . . . . *A. byrrhidiphagus* n.sp. (p. 43)
- F2 at most 2.7 time as long as wide . . . . . *A. alaskae* Annecke and Doutt (p. 44)

6(4) F2 usually with 1, rarely 2, sensory ridges 7
- F2 without sensory ridges 8

7(6) Smaller species (FWL less than 780µm); FWL/FWW greater than 6.0 . . . . . *A. nigrellus* Girault (p. 45)
Larger species (FWL about 840µm); FWL/FWW less than 5.7 . . . . . *A. hercules* Girault (p. 47)

8(6) Host: *Oulema melanopus* (Chrysomelidae) . . . . . *flavipes* Förster (p. 47)
- Host: *Dibolia borealis* (Chrysomelidae) . . . . . *behmani* Girault (p. 50)

Anaphes sinipennis Girault
(Figs. 20, 37)

Anaphes sinipennis Girault 1911c: 187 (***nomen nudum***); Girault 1911e: 280; Girault 1912b: 153; Girault 1913: 117; Girault 1929: 13; Burks 1979: 1029; Schauff 1984a: 48.
Mymar sinipennis; Peck 1951: 416; Peck 1963: 41.

Type material. SYNTYPES ♀♀ (INHS) [not examined]. I could not locate the type specimens and they have evidently been missing for many years because neither Frison (1927) nor Webb (1980) listed them. Girault (1911e) designated two of the three original specimens as types but did not designate a holotype. There are two female specimens in the USNM identified as *A. sinipennis* by Girault. Neither belongs to the type series. They were collected in the type locality (Urbana, IL) on 14.VIII.1901 on a greenhouse window by Girault, and 20.V.1911 on a window by Williamson and Girault, respectively. Both specimens agree very well with the original description and can serve as reference specimens. A neotype is not designated for this distinctive species.

Diagnosis. Female. Differs from all other North American *Anaphes* by the following combination of attributes: F1-F4 without sensory ridges, F5 with 1, and F6 with 2 ridges; club slightly wider apically than basally, often almost truncate apically, and very wide relative to F6 (Fig. 37); fore wing (Fig. 20) very narrow (FWL/FWW 9.6-10.8) and distinctly curved apically and hind margin of fore wing distinctly concave. *A. sinipennis* is very similar to *A. fuscipennis* in antennal structure.

Description. Female. Colour. Body uniformly dark brown. Fore wing distinctly tinged with brown behind venation, especially behind stigmal vein and apex of marginal vein, and in marginal space; posterior margin entirely rimmed with brown. Hind wing uniformly tinged with brown.

Body length. $\bar{x}$=591 (496-880, n=9).

Head. Head width 213 (200-230, n=10); occipital suture represented by very short line almost parallel to posterior orbit, extending to level well above dorsal margin of foramen magnum. Length of antennal articles (n=10): radicle+scape 143 (132-165); pedicel 60 (54-67); F1-F6 27 (23-31), 48 (38-56), 46 (40-55), 44 (40-51), 47 (40-55), 53 (47-60); club 130 (121-143). F1-F4 narrower than F5 and F6 and without sensory ridges, F5 with 1 and F6 with 2 ridges; club often slightly wider apically than basally, and truncated apically (Fig. 37).

Mesosoma. Mesoscutum width 168 (148-173, n=7).

Wings. Fore wing length 716 (625-804, n=11), width 70 (58-86), posterior margin concave (Fig. 20); length of marginal space 148 (129-176); FWW/FWL 10.25 (9.6-10.8); LMC 160 (139-173) about 2.3 times wing width. Hind wing length 703 (615-783), width 23 (19-29); LMC/HWW about 5.4.

Metasoma. Ovipositor length 248 (227-290, n=8), about 1.0 times hind tibial length, extending anteriorly at most to base of hind coxa

Male. Similar to female. Length of antennal articles (excluding F1 which is minute) (n=1): radicle+scape - ; pedicel 49; F2-F11 67, 76, 78, 76, 76, 75, 81, 80, 78, 67.

Distribution. North America.

Material examined. 41♀♀ and 1♂ (23 on slides).

CANADA. **Alberta**. Wagner Natural Area, 6 km W. Edmonton, 6-13.VIII, 13-22.VIII, 28.VIII-10.IX.1985, A. Finnamore and T. Thormin (24♀♀ and 1♂, PMAE, CNCI). **Nova Scotia.** S. Harbour, 60º67'W, 46º52'N, 28-31.V.1983 (1♀, CNCI). **Ontario.** London, Fanshawe experimental farm, 1-31.IX.1982, A. Tomlin (1♀, CNCI); Ottawa, 2-14.IX.1991, J.R. Vockeroth (1♀, CNCI), Mer Bleue, 16-23.VIII.1982, H. Goulet (1♀, CNCI); Oxford Mills, 22-25.V, 25-28.V,

29.V-1.VI, and 1-5.VI.1973, L. Masner (10♀♀, CNCI). **Québec.** Gatineau Park, Camp Fortune, 1-14.VI.1983, J. Denis (1♀, CNCI).

U.S.A. **California**. *Tulare Co.*: Ash Mountain Power Station # 3, 26.VI.1983, J.A. Halstead (1♀, CNCI). **Florida**. *Manatee Co.*: Bradenton, 1-7.IV.1986, D.J. Schuster (1♀, CNCI). **Illinois.** *Champaign Co.*: Urbana, 20.V.1911, Williamson and A.A. Girault (1♀, USNM), 14.VIII.1901, A.A. Girault (1♀, USNM). **Maryland**. *Prince George's Co.*: Patuxent Wildlife Research Center, 22-25.VI.1980, L. Masner (1♀, CNCI).

Hosts and Biology. Unknown. *A. sinipennis* is found mostly in riparian habitats. A specimen from Ottawa was collected by sweeping *Sagittaria*. One from London was collected in an onion field.

Comments. Although the type series is missing, the detailed original description and the existence of two specimens determined by Girault (USNM) permits the species to be recognized. The paper by Girault (1911c) in which the specific epithet *sinipennis* was mentioned precedes the formal description of the species (Girault 1911e) by about 1 month.

Anaphes fuscipennis Haliday
(Figs. 2, 6, 9, 17, 21)

Anaphes fuscipennis Haliday 1833: 346; Walker 1846: 51; Förster 1847: 213; Loew 1847: 342; Lubbock 1863: 2; Kirchner 1867: 202; Ashmead 1904: 363; Schmiedeknecht 1909: 499; Gahan and Fagan 1923: 12; Kloet and Hincks 1945: 304; Soyka 1946b: 180; Debauche 1948: 159; Debauche 1949: 64; Gahan 1949: 204; Kryger 1950: 9; Soyka 1955: 461; Annecke and Doutt 1961: 19; Tudor and Boţoc 1975: 179; Fitton *et al.* 1978: 110; Trjapitzin 1978: 528; Graham 1982: 206; Schauff 1984a: 48; Huber 1986: 197; Trjapitzin 1987: 963.

Mymar fuscipennis; Soyka 1949: 310.

Anagrus fuscipennis; Blanchard 1840: 293.

Anaphes pratensis Förster 1847: 211; Loew 1847: 342; Kirchner 1867: 202; Ashmead 1897: 138; Dalla Torre 1898: 424; Lameere 1907: 247; de Gaulle 1908: 110; Schmiedeknecht 1909: 499; Girault 1911b: 135; Girault 1911c: 188; Girault 1911d: 364; Girault 1912a: 88; Girault 1912c: 299; Girault 1914: 110; Britton 1920: 323; Howard 1927: 14; Christie 1929: 43; Girault 1929: 14; Pack and Fife 1930: 30; Couturier 1935: 89; Feytaud 1937: 66; Soyka 1946a: 40; Debauche 1948: 163; Hamlin *et al.* 1949: 58; Soyka 1949: 310; Thompson 1958: 568; Hincks 1960: 213; Boţoc 1962: 111; Bakkendorf 1964: 4; Brunson and Coles 1968: 6; Tudor and Boţoc 1975: 180; Aeschlimann 1975: 405; Aeschlimann 1977: 111; Clausen 1978: 267; Fitton *et al.* 1978: 110; Trjapitzin 1978: 528; Burks 1979: 1029; Aeschlimann 1980: 145; Schaber 1981: 169; Graham 1982: 206; Collins and Grafius 1983: 2; Huber 1986: 197; Trjapitzin 1987: 963.

Mymar pratensis; Peck 1951: 416; Clausen 1956: 116; Peck 1963: 41.

Ferrierella pratensis; Soyka 1949: 347.

Ferrierella capitulata Soyka 1949: 341. **Syn. n.**

Ferrierella filicornis Soyka 1949: 343. **Syn. n.**

Ferrierella maculata Soyka 1949: 345. **Syn. n.**

Ferrierella neopratensis Soyka 1946b: 182; Soyka 1949: 338; Schauff 1984a: 47. **Syn. n.**

Ferrierella stammeri Soyka 1949: 349. **Syn. n.**

Type material. ***Anaphes fuscipennis***. LECTOTYPE ♀ (NMID) [examined]. On card labelled: 1."37.XX"[blue label]. 2."British Haliday 20.2.82." 3."*fuscipennis*.". 4."*Anaphes fuscipennis*

Haliday LECTOTYPE: ♀ M. de V. Graham det. 1972". The lectotype is in good condition, mounted dorsal side up and slightly on its left side. PARALECTOTYPES were designated and discussed by Graham (1982). I examined 1 male in good condition on a card point, which was collected on the same date as the lectotype.

Anaphes pratensis. LECTOTYPE ♀ (NHMW), here designated. On slide labelled: 1."*An. pratensis* Förster, Type. 2."Collect. G. Mayr". 3."61". 4."In Canadab. 1944". 5."Co-Type". 6."*Ferrierella* ♀ *pratensis* Förster Type dt. Soyka". 7."LECTOTYPE *Anaphes pratensis* Förster ♀ des. Huber 1987". The lectotype is in reasonable condition, mounted laterally. PARALECTOTYPES, here designated: 3♂♂, same data (handwritten by Soyka) as lectotype but numbered "62", "63", and "64", respectively. They are dirty and in rather poor condition.

Förster (1847) did not state how many specimens of *A. pratensis* he had. Soyka (1949) found a female on a minuten pin in Mayr's collection which he slide mounted. He also slide-mounted 3 males, evidently from the same pinned series, which he did not directly mention in his redescription. Soyka labelled Förster's female specimen as co-type, although in his description he referred to it as "type". He then incorrectly labelled as "type" a specimen (no. 891) that he himself had collected in 1934. Soyka (1949) stated that males were doubtfully known ("noch unsicher") presumably referring to the male specimens from Mayr's collection that he had slide mounted. I agree with him regarding these 3 males. None of them are conspecific with the lectotype because the relative proportions of tarsomere 1 and 2 are not those of *A. fuscipennis*. I do not know to which species they belong but they undoubtedly belong to the original syntypical series so I labelled them as paralectotypes.

Anaphes capitulata. HOLOTYPE ♀ (NHMW). On slide labelled: 1."*Ferrierella* ♀ *capitulata* Soyka Type". 2."Type". 3."864". 4."Valkenburg, Holland IgnatiusKolleg am fenster 31. Juni 1931 lg Soyka In Canadab. 1941". The holotype is in good condition, mounted laterally.

Anaphes filicornis. HOLOTYPE ♀ (NHMW). On slide labelled: 1."*Ferrierella* ♀ *filicornis* Soyka Type". 2."Type". 3."873". 4."Valkenburg-Holland Ignat.-Koll. am fenster 31.Juni 1931 - lg Soyka Coll. Soyka In Canadab.". The holotype is in good condition, mounted laterally.

Ferrierella maculata. HOLOTYPE ♀ (NHMW). On slide labelled: 1."*Ferrierella* ♀ *maculata* Soyka Type". 2."Type". 3."877". 4."Valkenburg Holland Ignatiuskolleg am fenster 18 Juni 1931 lg [something illegible] det W. Soyka In Canadab. 1941". The holotype is in good condition, mounted laterally with head detached and face down.

Ferrierella neopratensis. HOLOTYPE ♀ (NHMW). On slide labelled: 1."*Ferrierella neopratensis* Soyka ♀ Geno-Type". 2."G.Type". 3."881". 4."Hundsheim-SpitzerBerg Südseite 2 Sept. 1941 lg Novicky [something illegible] et det W. Soyka In Canadab. 1941". The holotype is in good condition, mounted laterally.

Ferrierella stammeri. HOLOTYPE ♀ (NHMW). On slide labelled: 1."*Ferrierella* ♀ *stammeri* Soyka Type". 2."Type". 3."901". 4."Breslau-Grüneiche D'land - 24.IX.1933 lg. Stammer In Canadab.". The holotype is in poor condition (head, 1 fore wing, 1 hind wing and 1 antenna beyond scape detached) and poorly oriented near edge of cover slip.

Diagnosis. Female. Differs from all other North American *Anaphes* by the following combination of attributes: F1-F4 of antenna distinctly narrower than F5 and F6, and without sensory ridges (Fig. 9); fore wing with hind margin straight or slightly convex; tarsomere 1 of hind leg at least 1.6 times as long as tarsomere 2 (subequal in other species).

Description. Female. Colour. Dark brown. Fore wing with some infuscation behind venation and narrowly along posterior margin for short distance beyond frenal fold.

Body length. $\bar{x}$=693 (471-923, n=10).

Head. Head width 298 (266-329, n=8); occipital suture represented by short line almost parallel to posterior orbit, extending ventrally to level of dorsal margin of foramen magnum. Length of antennal articles (n=10): radicle+scape 138 (118-164); pedicel 64 (57-64); F1-F6 33 (29-38), 98 (84-118), 89 (68-109), 78 (65-94), 73 (59-87), 72 (63-84); club 143 (132-156). F1-F4 distinctly narrower than F5 and F6 and without sensory ridges, F5 with 1 and F6 with 2 sensory ridges (Fig. 9).

Mesosoma. Mesoscutum width 246 (228-269, n=5).

Wings. Fore wing length 900 (766-1069, n=9), width 191 (141-257), posterior margin straight or slightly convex (Fig. 21); length of marginal space 152 (131-203); FWW/FWL about 4.8 (4.16-5.13); LMC 173 (151-195), about 0.9 times wing width. Hind wing length 871 (739-1057), width 43 (35-60); LMC 150 (121-191); LMC/HWW about 3.5.

Metasoma. Ovipositor length 474 (442-529, n=8), about 1.5 times hind tibial length, extending anteriorly at most to base of hind coxa.

Male. Similar to female. Length of antennal articles (excluding F1 which is minute) (n=3): radicle+scape 103 (96-118); pedicel 48 (45-54); F2-F11 69 (61-78), 74 (68-87), 72 (64-84), 71 (66-78), 68 (64-76), 69 (66-74), 70 (65-74), 72 (68-79), 69 (66-74), 76.

Distribution. Europe, Algeria, Israel, North America. North American specimens examined were collected from March to August, October and November. European specimens examined were collected from January to February and in May. Schaber (1981) summarized the distribution of *A. fuscipennis* in N. America. I include only specimens that I have examined in the distribution list below.

Material examined. 80♀♀ and 16♂♂ (23 on slides).

ALGERIA: Atlas de Blida, Chréa sur Blida, 1400m, 3.v.1988, C. Besuchet, I. Löbl and D. Burkhardt (1♀, MHNG); Oran, bord de route D75, 27.XII.1958, J. Barbier (1♀, CNCI).

CANADA. **British Columbia.** Burnaby Mt., 14-18.IV.1980, D.G. Gillespie (1♀, CNCI); Sidney, 1-28.IV.1986, D.G. Gillespie (6♀♀ and 4♂, CNCI), Summerland, 5.V.1959, R.E. Leech (1♀, CNCI). **Nova Scotia.** Cape Breton Highlands National Park, Chéticamp, 31.V.1984 (2♀♀, CNCI), Chéticamp river, 28.V, 30.V, and 1.VI.1984, H. Goulet (3♀♀ and 1♂, CNCI), MacKenzies Peak, 11.VII.1983, J.R. Vockeroth (1♀, CNCI). **Ontario.** Almonte, 3-12.V.1986, H. Goulet and L. Dumouchel (2♀♀, CNCI); 7 mi. w. Carleton Place, 20-25.VI.1980, S.J. Miller (1♀, CNCI); Chatterton, 13 mi N. Belleville, 29.V.1967, 8.IV. 18.V. and 30.X.1968, C.D. Dondale (8♀♀, CNCI); Gloucester, 4-17.X.1984, M. Sanborne (1♀, CNCI); London, Fanshawe experimental farm, 5.XI.1982, A. Tomlin (1♀, CNCI); Owen Sound, 22.V.1978, J.M. Cumming (2♀♀, CNCI); Shirley's Bay, Innes Point, 3-10.X.1985, J. Denis (1♀, CNCI). **Quebec.** Gatineau Park, Ridge Road, 9.V.1986, S.B. Peck (4♀♀, CNCI), Luskville Falls, 300m, 9-21.V.1986, J. Denis and L. Dumouchel (4♀♀, CNCI).

ISRAEL. Galilee, Eilon, N. Betzet, 20.IV.1982, C. Besuchet and I. Löbl (3♀♀, MHNG).

U.S.A. **California**. *Contra Costa Co.*: El Cerrito, 6.III.1948, R.L. Doutt (1♀, USNM). **Connecticut.** *New Haven Co.*: New Haven, 10.V.1904, H.L. Viereck (1♀ and 1♂, USNM). **Delaware**. *Kent Co.*: Smyrna, 8.III.1972, D.W. Angalet (2♀♀, USNM). **Idaho.** *Shoshone Co.*: Hobo Cedar Gr. 15.VII-23.VIII.1985 (1♀, UICM). **Illinois.** *Champaign Co.*: Urbana, 7.V.1911, A.A. Girault (1♀, USNM). **Michigan.** *Berrien Co.*: Niles, 13.V.1969, T.R. Burger (1♀, USNM). **New York**. *Tompkins Co.*: Ithaca, V.1924, H.J. Pack (5♀♀, USNM). **Oregon**. *Jackson Co.*: Medford, J.C. Hamlin (6♀♀ and 1♂, USNM). **Utah**. *Salt Lake Co.*: Salt Lake City, 25.III, and 10.V.1926, T.R. Chamberlin (5♀♀, USNM), 9.VI.1911, T.H.Parks (1♀, USNM). **Wisconsin.** *Columbia Co.*: Ray Geyman farm, 10 mi. E. Baraboo, fall.1984, W. Gould (4♀♀, CNCI); *Dane Co.*: Madison, V.1985, W. Gould (10♀♀ and 9♂♂, CNCI).

Hosts and Biology. Curculionidae: *Sitona humeralis* Stephens (Aeschlimann 1977), *Hypera postica* (Gyll.), and *H. punctata* (Fabr.) (Clausen 1956). Ashmead (1897) recorded *Cecidomyia avenae* March. (Cecidomyiidae) as a host but this has never been corroborated and it is probably incorrect. Couturier (1935) and Feytaud (1937) recorded unsuccessful attempts by *A. fuscipennis* to parasitize eggs of *Leptinotarsa decemlineata* (Say). If this mymarid identification is correct (voucher material was not studied), then this demonstrates the opportunistic nature of mymarids, in that unsuitable, unrelated, hosts may be attacked. An interesting note is that the five specimens from Ithaca, New York, were collected from the stomach of a trout.

Comments. Because of its potential as a biological control agent there is a considerable literature, including at least one thesis (Gould 1986) referring to *A. fuscipennis*. This species of European origin was probably introduced into North America together with *A. luna* beginning in 1911 (Clausen 1956, 1978). At the time of introduction, and for many years after, the two species were confused so that earlier references (before about 1950) to one or the other species may have referred to both. The female antenna figured in Chamberlin (1924) is almost certainly that of *A fuscipennis* rather than *A. luna*. Thus, early references to *A. luna* in N. America, as summarized under *Mymar pratensis* by Peck (1963) and discussed by Schaber (1981) evidently referred, at least in part, to *A. fuscipennis* (as *A. pratensis*). Those references that specifically mention *A. pratensis* are included above.

If *A. fuscipennis* had become established upon its original release in May-June, 1911, in Utah then it would have had to spread exceedingly rapidly on its own to Urbana, Illinois, where Girault collected one specimen in May, 1911. But, in fact, the species (under the name *A. luna*) did not become established at that time (Chamberlin 1924). Therefore, *A. fuscipennis* already occurred in N. America, perhaps as a previous accidental introduction, but went unrecognized until field-collected eggs of its hosts were reared for parasites.

Graham (1982) stated that *Anaphes fuscipennis sensu* Debauche (1948) is certainly not *A. fuscipennis*. I examined Debauche's specimens and conclude that they are the same as *A. medius* (Soyka). Hellén's (1974: 25) redescription of *A. fuscipennis* applies to another species, not *A. fuscipennis*. The record by Varis (1972: 22), quoted by CIBC (1979: 4), of *A. fuscipennis* reared from *Lygus* is probably the same species as *A. fuscipennis sensu* Hellén. The reference to *A. fuscipennis* by Bouček (1974: 248) probably also refers to a species other than *A. fuscipennis*.

Anaphes iole Girault

(Figs. 54, 60, 64, 68, 70, 72, 73-76)

Anaphes iole Girault 1911b: 135 (*nomen nudum*); Girault 1911c, 188 (*nomen nudum*); Girault 1911e: 284; Girault 1912a: 89; Girault 1916: 6; Girault 1929: 13; Thompson 1958: 568; Burks 1967: 215: Burks 1979: 1029; Schauff 1984a: 48; Huber and Rajakulendran 1988: 894; Sohati *et al.* 1989: 1127; Cohen *et al.* 1989: 15; Jones and Jackson 1990: 463.

Mymar iole; Soyka 1949: 331; Peck 1951: 416; Peck 1963: 39.

Anaphes iole anomocerus Girault 1929: 13; Huber and Rajakulendran 1988: 894.

Mymar iole anomocerus; Soyka 1949: 331.

Anaphes anomocerus; Strong 1936: 66; Strong 1937: 57; Strong 1938: 52; Ewing and Crawford 1939: 303; Thompson 1958: 568; Burks 1979: 1029; Rajakulendran and Cate 1986: 255; Strand 1986: 107.

Mymar anomocerus; Peck 1951: 416; Peck 1963: 38.

Anagrus ovijentatus Crosby and Leonard 1914a: 181; Crosby and Leonard 1914b: 483; Gahan *et al.* 1928: 984; Glick 1939: 48; Hoebeke 1980: 20.

Anagrus ovijententatus; Bakkendorf 1926: 270 (= *Anaphes*). Incorrect subsequent spelling.

Anaphes ovijentatus; Girault 1929: 14; Romney and Cassidy 1945: 497; Clancy and Pierce 1966: 854; Stoner and Surber 1969: 501; Stoner and Surber 1971: 1566; Varis 1972: 22; Scales 1973: 305; Sillings and Broersma 1974: 124; Burks 1979: 1029; CIBC 1979: 4; Graham and Jackson 1982: 56; Jackson and Graham 1983: 772; Collins and Grafius 1983: 2; Jackson and Cohen 1984: 437; Graham *et al.* 1984: 250; Graham *et al.* 1986: 138; Jackson 1986: 149; Strand 1986: 107; Jackson 1987: 367; Jackson and Debolt 1987: 10; Gordon *et al.* 1987: 347; Driesche and Hauschild 1987: 27; Debolt 1987: 82; Huber and Rajakulendran 1988: 894; Jackson *et al.* 1988: 919.

Mymar ovijentatus; Soyka 1949: 332; Peck 1951: 416; Peck 1963: 39; Stoner and Surber 1969: 501.

Anaphes perdubius Girault 1916: 6; Beyer 1921: 24; Girault 1929: 14; Couturier 1935: 92; Thompson 1958: 568; Burks 1979: 1029; Huber and Rajakulendran 1988: 894.

Mymar perdubius; Soyka 1949: 332; Peck 1951: 416; Peck 1963: 40.

Type Material. ***Anaphes iole.*** HOLOTYPE ♀ (INHS) [not examined]. Girault described *A. iole* from a single female specimen. The type is no longer in the INHS and has been missing for many years because neither Frison (1927) nor Webb (1980) mentioned it.

Anaphes ovijentatus. LECTOTYPE ♀ (CUIC), here designated. On slide labelled: 1."No. HOLOTYPE *Anagrus ovijentatus* Crosby and Leonard Date Oct. 7, 1913 Ithaca, N.Y.". 2."HOLOTYPE Cornell U. No. 42.1". 3."LECTOTYPE *Anagrus ovijentatus* Crosby and Leonard ♀ des. Huber 1987". The lectotype is in good condition, mounted laterally with head detached and face up. PARALECTOTYPE, here designated: 1♀ in a microvial in alcohol, in very poor condition (only part of mesosoma and legs remaining). Crosby and Leonard (1914a) described *ovijentatus* from three females. Only two females were found. Hoebeke (1980) incorrectly stated that the type series consisted of a holotype and two paratypes, but because Crosby and Leonard (1914a) did not designate a holotype in the description a lectotype is designated here.

Anaphes anomocerus. LECTOTYPE ♀ (USNM), here designated. On slide labelled: 1."*Anaphes perdubius* Girault ♂ ♀ *anomocerus* Gir. *anomocerus* Type No. 20966 U.S.N.M.". 2."Webster No. 16806 *Anaphes perdubius* Gay. Ga. 9-9-1916 *anomocerus* Gir. Egg parasite *H. citri* on alfalfa ♂ ♀ types. A.H. Beyer". 3."LECTOTYPE *Anaphes anomocerus* Girault des. Huber 1987". The lectotype is in good condition, mounted on its left side.

The only description of *A. anomocerus* occurs in a key (Girault 1929) with no indication of how many specimens had been examined, or what the collection data was. The collection data is given on the type slides and is also entered in the type book at the U.S. National Museum (as *Anaphes perdubius anomocerus*). I examined six specimens on two slides. The lectotype slide bears, under a single badly crushed coverslip, two dark coloured *A. anomocerus* male and female positioned one on top of the other, one light coloured *anomocerus* female, and three females of *Anagrus* sp. The light coloured *anomocerus* is designated as lectotype. It is poorly positioned alone near the edge of the coverslip. PARALECTOTYPES, here designated: 1♀ and 1♂ *A. anomocerus* on the lectotype slide and the 3♂♂ *A. anomocerus* on the second slide, all under one coverslip with three *Anagrus* sp.

Anaphes perdubius. HOLOTYPE ♀ (USNM). On slide labelled: 1."*perdubius* 19186". 2."Webster No. 8827 *Anaphes perdubius* Gir. Salt Lake City Utah Sept. 2 1912 reared from Jassid eggs *Anagrus nigriventris* C.N. Ainslie Collector". The holotype is in reasonably good condition, with left antenna and right hind wing missing, metasoma broken off and mounted laterally, head broken off and mounted face up, mesosoma mounted dorsolaterally with wings outstretched.

Diagnosis. Female. Differs from all other North American *Anaphes* by the following combination of attributes: head with occipital suture converging to foramen magnum; dorsal surface of fore-wing blade with posterior row of microtrichia usually separated from hind margin by a distinct gap of about 1 microtrichia length; posterior margin of fore wing hyaline except for apex; mesosoma relatively long compared to metasoma.
Description. The species was redescribed by Huber and Rajakulendran (1988).
Comments. The importance of *A. iole* as a potential biological control agent of species of *Lygus* and *Pseudatomoscelis* has resulted in a considerable literature and at least two theses (Jackson 1982; Rajakulendran 1986). The two papers by Girault (1911b,c) in which the specific epithet *iole* was mentioned precede the formal description of the species (Girault 1911e) by about 1 month.

Anaphes byrrhidiphagus Huber sp.n.
(Figs. 4, 5, 22, 38)

Type material. HOLOTYPE ♀ (USNM): on slide under 3 cover slips, labelled: 1."OR. Benton Co. Mary's Peak n. side 27-III-77 P.J. Johnson ex. egg *Lioligus nitidus* in moss". 2."*Anaphes byrrhidiphagus* Huber ♀ HOLOTYPE U.S.N.M. Type no. 104415." In good condition, dissected and mounted under 4 cover slips. ALLOTYPE ♀ (USNM), same locality as holotype, ex. *Lioon* sp. PARATYPES. 88♀♀ and 20♂♂, all in CNCI unless otherwise noted. CANADA. **British Columbia.** East Sooke Pk, 12-24.IX.1984, R.A. Cannings (1♀ on point); Queen Charlotte Islands, Graham Island, Tow Hill, 7.VII.1983, I.M. Smith (1♀ on point); Queen Charlotte Islands, Graham Island, Massett Beach nr. Chown River, 9-13.VII.1983, I.M. Smith (1♀ on point); Smithers, Hudson Bay Mtn, 20.VII.1983, J.D. Smith (2♀♀ on slide and point); Terrace, 5.VIII.1960, W.R. Richards (1♀ on point); Vancouver Island, Lake Cowichan, 19-28.VII.1985, I.M. Smith (1♂ and 2♀♀ on points); Vancouver, Point Grey, IV.1975, J.R. Vockeroth (1♀ on point). **Manitoba.** Churchill, 9.VIII.1952, J.G. Chilcott (1♀ on slide, CNCI). **Quebec.** Chimo, 17-18.VIII.1959, W.R.M. Mason (2♀♀ on slides CNCI); Great Whale River, 8.VIII.1959, W.R.M. Mason (1♀, CNCI). USA. **Alaska and Yukon.** Chicken to Dawson, 16.VIII.1984, S.and J. Peck, car net (1♀ on point). **Idaho.** *Idaho Co.*, 10 mi. E. Slate Creek, 22.VI.1984 (1♀ and 3♂♂, UICM); 22 mi. ESE. Lowell, 25.VIII.1985, T.D. Miller (1♀, UICM); *Shoshone Co.*, Hobo Cedar Gr., 15.VII-23.VIII.1985, T.D. Miller (3♀♀ and 1♂, UICM). **Oregon.** *Benton Co.*, Philomath, Mary's Peak, Parker Creek, 14.VII.1985, I.M. Smith (10♀♀ and 1♂ on slides, 21♀♀ and 4♂♂ on points); *Benton Co.*, Philomath, Mary's Peak, along Parker Creek, 4000', 28.VI.1983, I.M. Smith (1♀ on point); *Curry Co.*, Port Oxford, 10.VII.1985, I.M. Smith, stream by road to Gribble Campground (3♀♀ on points); *Lane Co.*, Deadwood Creek, 18.VIII.1982, J.B. Woolley (3♀♀ and 2♂♂ on points). **Washington.** *Jefferson Co.*, Olympic National Park, Quinault Rain Forest, 19 mi. E. Quinault, 13.VIII.1985, A. Finnamore, T. Thormin (4♀♀ on points); *Pierce Co.*, Mt. Rainier National Park, Sunshine Point Campground, 11.VII.1985, A. Finnamore, T. Thormin (1♀ on point); Mt. Rainier National Park, Longmire Marsh, 1000m, 29.VII.1985, L. Masner (2♀♀ and 1♂ on slides, 4♀♀ and 1♂ on points); Mt. Rainier National Park, Van Trump Park, 1500-1800m, 29.VII.1985, L. Masner, subalpine meadows and forest (20♀♀ and 6♂♂ on points, CNCI, USNM, BMNH).
Diagnosis. Female. Differs from all other North American *Anaphes* by the following combination of attributes: F3, 5 and 6 with 2 sensory ridges, F4 narrower, with 1 sensory ridge, remaining flagellomeres without sensory ridges; F2 at least 4.7 times as long as its apical width and at least 3.0 times as long as F1. Fore wing relatively large (long and wide) compared to body.

Description. Female. Colour. Dark brown; scape, pedicel and legs, especially fore legs, brown to light brown, sometimes yellowish. Fore wing with brown infuscation behind venation and narrowly along posterior margin almost to apex. Both wings with slight brown suffusion.

Body length. $\bar{x}$=696 (558-818, n=12).

Head. Head width 252 (224-281, n=8); occipital suture represented by short line almost parallel to posterior orbit, extending ventrally at least to level midway between dorsal and ventral margins of foramen magnum. Length of antennal articles (n=10): radicle+scape 152 (134-167); pedicel 63 (54-79); F1-F6 33 (30-36), 106 (90-128), 102 (96-159), 94 (84-109), 89 (80-102), 82 (75-92); club 162 (136-180). F3, F5 and F6 each with 2 sensory ridges, F4 with 1 sensory ridge (Fig. 38).

Mesosoma. Mesoscutum width 212 (167-235, n=6).

Wings. Fore wing length 1104 (973-1234, n=10), width 268 (209-335), posterior margin straight or very slightly concave (Fig. 22); length of marginal space 160 (136-211); FWW/FWL about 4.2 (3.68-4.69); LMC about 168 (136-192), about 0.6 times wing width. Hind wing length 992 (881-1100), width 51 (41-64); LMC/HWW about 3.2.

Metasoma. Ovipositor length 329 (273-387, n=10), about 0.9 times hind tibial length, extending anteriorly at most to halfway between base and apex of middle coxa.

Male. Similar to female. Length of antennal articles (excluding F1 which is minute) (n=2): radicle+scape 140 (129-152); pedicel 53 (44-63); F2-F11 140 (120-159), 141 (130-151), 141 (127-155), 139 (127-150), 134 (121-146), 127 (112-142), 130 (≈111-149), 134 (120-147), 132 (124-140) 133 (126-141).

Distribution. Northwestern USA and boreal Canada. Specimens examined were collected in July and August. The holotype and allotype were reared from their respective hosts in March, presumably under laboratory conditions.

Hosts and Biology. ex. *Lioon simplicipes* (Mannerheim) and *Lioligus nitidus* (Motschulsky) (Byrrhidae) in moss.

Comments. This species was mentioned by Schauff (1984a: 48) as "an undetermined species, probably new" in his discussion of *Anaphes* hosts. It is the largest North American species of *Anaphes*.

Anaphes alaskae Annecke and Doutt

Anaphes alaskae Annecke and Doutt, 1961: 47; Burks, 1979: 1028.

Type material. Holotype ♀ (CISC) [examined]. On slide under 4 cover slips, labelled: 1."Berlese funnel? Holotype Point Barrow, Alaska July 17, 1952 P.D. Hurd". 2."*Anaphes alaskae* n. sp. HOLOTYPE Det. D.P. Annecke and R.L. Doutt".

Diagnosis. Female. Differs from all other North American *Anaphes* by the following combination of attributes: blunt and widely rounded apex of club, F4 with 1 (occasionally 0) sensory ridge, F4 at most 2.7 times as long as wide, tarsomere 1 of hind leg about 1.5x as long as tarsomere 2.

Description. The species was well described and illustrated by Annecke and Doutt (1961) so measurements and descriptive notes only are given here based on the few specimens examined.

Female. Colour. Body dark brown; legs, scape and pedicel brown. Fore wing narrowly brown along posterior margin.

Body length. $\bar{x}$=852 (742-973, n=6).

Head. Head width 296 (289-303, n=2); occipital suture represented by short line almost parallel to posterior orbit, extending ventrally to level of dorsal margin of foramen magnum. Length of antennal articles (n=2): radicle+scape 164 (163-165); pedicel 66 (62-69) F1-F6 34 (32-36), 61 (60-63), 63 (60-66), 57 (56-58), 50 (no variation), 53 (53-54); club 164 (161-166). F3-5 each with 1 sensory ridge, F6 with 2 sensory ridges. Club apex bluntly rounded.

Mesosoma. Mesoscutum width 237 (n=1).

Wings. Fore wing length 966 (951-982, n=2), width 182 (171-194), posterior margin straight; length of marginal space 164 (145-183); FWW/FWL about 5.3 (5.13-5.54, n=2); LMC 140 (133-147), about 0.77 times wing width. Hind wing length 915 (886-944), width 38 (3740); LMC 151 (136-166); LMC/HWW about 4.0.

Metasoma. Ovipositor length 343 (n=1), about 1.0 times hind tibial length, extending anteriorly at most to apex of hind trochanter.

Male. See Annecke and Doutt (1961).

Distribution. North America, north of the Arctic circle. The specimens examined were collected in June and July.

Material examined. 8♀♀ (2 on slides).

CANADA. **Northwest Territories.** Victoria Island, 71º17'N, 114ºW, 8-10 and 23-28.VII.1975, G.and M. Wood (4♀♀, CNCI). **Yukon.** Dempster Highway km 155 28.VI-2.VII and up to 16.VII.1982 (3♀♀, CNCI); Herchel Island, 7-16.VII.1971, W.R.M. Mason (1♀, CNCI).

Hosts and Biology. Unknown. The specimens examined were collected in pan traps on a south-facing tundra slope (Victoria Island) and at 4000' (Dempster Highway).

Comments. The specimens identified here as *A. alaskae* have the antennal proportions almost the same as described by Annecke and Doutt (1961) but are smaller than the holotype. I have seen many more female specimens from the localities listed above which have relatively longer flagellomeres. Possibly, these specimens should also be included in *A. alaskae* but until something is known about the hosts of this species and reared series can be obtained to assess variation, I prefer to restrict the species concept to those specimens most resembling the original description.

Anaphes nigrellus Girault
(Figs. 23, 39)

Anaphes nigrellus Girault 1911e: 282; Girault 1911b: 135; Girault 1911c: 188; Girault 1912a: 89; Frison 1927: 227; Girault 1929: 14; Burks 1979: 1029.

Mymar nigrellus; Soyka 1949: 332; Peck 1951: 416; Pec, 1963: 39.

Anaphes behmani Puttler *et al.* 1973: 1304 (misidentification).

Type material. HOLOTYPE ♀ (INHS). On slide labelled: 1."Type ♀ *Anaphes nigrellus* Girault". 2."Property of the Illinois Natural History Survey". 3."Urbana Ill., June 26 '09. J.D. Hood. *Anaphes nigrellus* Girault Flew into dish of xylol on table at Laboratory 44,228 Type S.1520". The holotype is in good condition, mounted laterally with head and propleura broken off and positioned face down. Girault (1911e) described this species from 1 specimen only.

Girault (1911e) examined 2♀♀ and 1♂ in addition to the holotype, none of which can be considered as type material although Girault labelled one female as "cotype" no. 13,808. Neither the "cotype" specimen in the USNM or the female collected at Urbana on October 19, 1910 (?INHS) could be found. The ♂ specimen labelled "Univ. Chicago. Allen. 554", which Girault claimed was undoubtedly one of *A. nigrellus*, was examined (slide mount, USNM).

Diagnosis. Female. Most similar to *A. hercules*. Both species have at least 1 sensory ridge on F2 of at least one antenna.

Description. Female. Colour (from faded specimens). Brown; legs, scape and pedicel laterally yellowish. Fore wing with faint brown infuscation along anterior margin and narrowly along posterior margin.

Body length. $\bar{x}$=539 (486-602, n=9).

Head. Head width 247 (229-251, n=5); occipital suture represented by line extending ventrally to level of ventral margin of foramen magnum. Length of antennal articles (n=7, except scape n=3): radicle+scape 136 (116-149); pedicel 52 (49-58); F1-F6 24 (23-26), 58 (42-62), 71 (65-75), 70 (63-73), 69 (64-74), 67 (64-72); club 122 (110-134). F3-6 each with 2 sensory ridges, F2 with 1 sensory ridge, although one specimen had 2 sensory ridges on one antenna (Fig. 39).

Mesosoma. Mesoscutum width 182 (171-200, n=4).

Wings. Fore wing length 730 (669-781, n=7), width 127 (105-141), posterior margin slightly concave (Fig. 23); length of marginal space 95 (88-105); FWW/FWL about 5.8 (5.26-6.37); LMC 139 (124-155), about 1.09 times wing width. Hind wing length 695 (640-738), width 30 (25-31); LMC/HWW about 3.93.

Metasoma. Ovipositor length 241 (215-272, n=7), about 0.9 times hind tibial length, extending anteriorly at most to apex of hind coxa.

Male. Similar to female. Length of antennal articles (excluding F1 which is minute) (n=1): radicle+scape 96; pedicel 28, F2-F11 68, 73, 73, 74, 67, 71, 72, 74, 69, 73.

Distribution. North America. Specimens were collected in May, July, and August.

Material examined. 13♀♀ and 3♂♂ (10 on slides).

CANADA. **Ontario.** London, Fanshawe Experimental Farm, 4-25.VIII.1982, A. Tomlin (6♀♀, CNCI), same locality but 3-12.VII.1982 (1♀, CNCI).

USA. **Missouri.** *Carrollton Co.*: Carrollton 18.V.1969, B. Puttler (CNCI, UMRM).

Hosts and Biology. Curculionidae. *Hypera compta* (Say), *H. eximia* (LeConte), *H. paludicola* Warner, *H. postica* (Gyllenhal) (Puttler *et al.* 1973). The specimens from London were collected from pan traps in an onion field. Mr. B. Puttler (pers. comm.) believes that *A. nigrellus* exhibits habitat preference with a behavioural response to moist environments which are the primary habitat of its hosts, *Hypera compta*, *H. paludicola* and *H. eximia*, and host plants. *H. postica* only served as a laboratory host. The host eggs are laid inside leaf tissue or stems. In contrast, *A. flavipes*, which I cannot separate reliably from *A. nigrellus*, parasitizes host eggs (*Oulema melanopus* and relatives) which are exposed on the plant surface.

Comments. I consider that the species reared from *Hypera* spp. by Puttler *et al.* (1973) and identified as *A. behmani* belong to *A. nigrellus*.

Because of the difficulty of reliably associating males and females of *Anaphes* and the small differences that separate the species I am not certain that the male identified by Girault as *A. nigrellus* really belongs to that species. Only the discovery of a host and subsequent association of the sexes by rearing can give an unequivocally correct association of sexes. Nevertheless, for the present, the male discussed by Girault is considered as being that of *A. nigrellus*.

A. nigrellus has no features that make it readily distinguishable. Many specimens were examined that may belong to *A. nigrellus* but they differ slightly in antennal proportions. Whether this represents intraspecific variation or specific differences cannot be resolved at present. Possibly, *A. behmani* should be synonymized under *A. nigrellus* but if so then both, in turn, should also be synonymized under *A. flavipes* because the differences among all three species are about the same. The definitions of the three species involve the relative lengths of F2 and F3 and the presence or absence of sensory ridges. One point-mounted specimen (from Carrollton) considered

here as *A. nigrellus* has one antenna with F3 1.6 times longer than F2 and about the same width whereas the other antenna has F3 only 1.17 times longer than F2 but distinctly wider. The sensory ridges on this specimens could not be seen but it is likely that one antenna had at least one sensory ridge on F2 whereas the other did not. In the absence of sufficient biological data this kind of variation would suggest that *A. nigrellus* and *A. behmani* (and probably other species such as *A. flavipes*) should be synonymized. I have not done this because of the biological observations by B. Puttler on habitat preference and location of host eggs that appear to support the distinctness of these two species.

Anaphes hercules Girault
(Figs. 26, 40)

Anaphes hercules Girault 1911e: 285; Girault 1911d: 364; Girault 1912a: 89: Frison 1927: 227; Girault 1929: 14; Burks 1979: 1029.
Mymar hercules; Soyka 1949: 331; Peck 1951: 416; Peck 1963: 39.
Type material. HOLOTYPE ♀ (INHS). On slide labelled 1."Mymarids *Anaphes hercules* [one illegible word follows] Girault ♀ Urbana, Illinois Type: June 8, 1910. 44242. Girault S1504". 2."Property of the Illinois Natural History Survey". 3."*Polynema consobrinus* Girault ♀ paratype [in pencil]". 4."Type *Anaphes* ♀ *hercules* Girault". The holotype is in fairly good condition, mounted dorsal side up with head detached and face up. The right flagellum beyond the pedicel is missing and the left antenna is poorly oriented and partly collapsed so that the basal articles cannot be measured accurately (Fig. 40).
Diagnosis. Female. This species is known only from the holotype whose measurements are given in Appendix I. It is tentatively separated from related species by the attributes given in the key. The fore wing (Fig. 26) is slightly larger than in related species but is otherwise similar to them in shape and setation.
Distribution. North America, Illinois.
Material examined. Holotype.
Hosts and Biology. Unknown.
Comments. The reference by Hartung (1919), quoted in Thompson (1958: 568) is probably incorrect but because I have not seen any voucher material I cannot determine the species involved. The reference to *Anaphes* nr. *hercules* (Flock *et al.* 1962: 278) is, in fact, *Anaphes iole* Girault (Huber and Rajakulendran 1988). Viereck (1923: 235) recorded a species nr. *hercules* from the Pribilof Islands. I have not seen specimens of this so cannot identify it. Judging from its large size and provenance, the species may be *A. byrrhidiphagus*.

Anaphes flavipes (Förster)
(Figs. 24, 41)

Gonatocerus flavipes Förster 1841: 45; Walker 1846: 53; Kirchner 1867: 201.
Anaphes flavipes; Förster 1847: 212; Loew 1847: 341; Kirchner 1867: 202: Dalla Torre 1898: 423; Schmiedeknecht 1909: 499; Debauche 1948: 160; Soyka 1949: 310; Anderson and Paschke 1968: 1; Anderson and Paschke 1969: 1316; Anderson and Paschke 1970a: 821; Anderson and Paschke 1970b: 107: Moorehead and Maltby 1970a: 675; Moorehead and Maltby 1970b: 1; Barton and Stehr 1970: 128; Bakkendorf 1970: 154; Maltby *et al.* 1971: 693; Morris and

Moorehead 1971: 41; Bjegovic 1971: 20; Dysart 1971: 445: Burger and Holmes 1972: 1185; Miczulski 1973: 98; Puttler *et al.* 1973: 1304; Maltby *et al.* 1973: 298; Stehr *et al.* 1973: 453; USDA 1972, 1974: 2; Hellén 1974: 25; Haynes *et al.* 1974: 167; Diadechko and Ruban 1974: 27; Aeschlimann 1975: 407; Favinger 1976: 227; Greathead 1976: 128; Bouček 1977: 122; Pavlov 1977: 151; Clausen 1978: 253; Trjapitzin 1978: 530; Burks 1979: 1029; Burger 1980: 39; Haynes and Gage 1981: 269; Pavlov 1981: 116; Hinton 1981: 238; Collins and Grafius 1983: 2; Lampert *et al.* 1983: 973; Staines 1984: 435; Lampert and Haynes 1985: 74; Huber 1986: 197; Davidson and Lyon 1987: 178; Hua 1987: 41; Trjapitzin 1987: 964; Donev 1987: 69; Ellis *et al.* 1989: 43; Glogowski 1989: 240.

Anaphes lemae Bakkendorf 1970: 153; Miczulski 1973: 98; Bouček 1977: 122; Trjapitzin 1978: 530; Collins and Grafius 1983: 2; Trjapitzin 1987: 964. **Syn. n.** (see comments below).

Patasson valkenburgica; Bakkendorf 1964: 3. (misidentification; corrected in Bakkendorf 1970: 153).

Anaphes sp.; Stehr 1969: 1.

Type material. ***Gonatocerus flavipes***. ?SYNTYPES (NHMW) [not examined]. The types were collected in Aachen, West Germany. Debauche (1948) believed that the species was described from a single specimen but did not mention that he had examined it. Soyka (1949) may have been the last and perhaps only person to have examined Förster's types of *Anaphes*, including *A. flavipes*, since they were described. He stated that the types were in too poor a condition to allow the species to be recognized. I searched for the Förster types in Vienna but, except for those of *A. pratensis*, could not find any of them.

Anaphes lemae. HOLOTYPE ♀ (ZMUC, Copenhagen) [examined]. On slide labelled: 1."*Anaphes lemae* Bkdf. ♀ Holotype. Lubin (city area) Poland Ex *Oulema* sp. leg. Miczulski prep. Bakkendorf". The holotype is in good condition, mounted laterally, uncleared, with club of left antenna collapsed. PARATYPES. 1♀ and 1♂ (USNM), with same data as holotype, in good condition. They are the same as *A. flavipes* in my opinion. Although the synonymy of *A. lemae* with *A. flavipes* was assumed by several workers (Dysart 1971; Miczulski 1973) it was never formalized so I synonymize them formally here.

Diagnosis. Female. This species cannot be adequately distinguished from *A. behmani* on morphological grounds. Both have a relatively short F2 without sensory ridges. Both are distinguished from *A. nigrellus* and *A. hercules* by F2 without sensory ridges (the latter each have 1 or 2).

Description. The description is based on reared specimens introduced from Europe into quarantine at the Biological Control Laboratory, USDA, Niles, Michigan. Colour is described from freshly collected (reared) and critical point dried specimens from North Carolina. **Female.** Colour. Dark brown, scape and pedicel laterally, and legs beyond coxae pale brown; tarsi slightly darker than rest of legs. Fore wing with faint brown infuscation behind venation.

Body length. $\bar{x}$=568 (409-657, n=10).

Head. Head width 242 (217-274, n=8); occipital suture represented by line extending ventrally to level of ventral margin of foramen magnum. Length of antennal articles (n=11): radicle+scape 121 (113-132); pedicel 49 (44-52); F1-F6 25 (21-30), 54 (36-66), 69 (57-76), 69 (52-78), 71 (60-78), 69 (53-76); club 125 (114-135). F3-6 subequal in width, each with 2 sensory ridges (Fig. 41).

Mesosoma. Mesoscutum width 177 (140-206, n=8).

Wings. Fore wing length 670 (559-747, n=11), width 90 (73-112), posterior margin slightly concave (Fig. 24); length of marginal space 108 (88-123); FWW/FWL 7.34 (6.65-7.89); LMC 137

(124-151), about 1.5 times wing width. Hind wing length 658 (568-715), width 25 (19-29); LMC 137 (124-151); LMC/HWW about 4.6.

Metasoma. Ovipositor length 248 (198-283, n=10), about 1.0 times hind tibial length, extending anteriorly at most to apex of mid tibia.

Male. Similar to female. Length of antennal articles (excluding F1 which is minute) (n=6): radicle+scape 100 (88-105); pedicel 43 (38-44); F2-F11 70 (59-76), 72 (62-78), 71 (63-75), 71 (64-78), 71 (64-76), 70 (64-75), 71 (63-76), 71 (64-70), 69 (62-72), 72 (68-75).

Distribution. Europe (see Dysart 1971, for distribution map and localities) and eastern North America. Field collected specimens from North America were collected mostly in June and July.

Material examined. 293♀♀ and 75♂♂ (302 on slides).

CANADA. **Ontario**. Delhi, 25.V.1988, C. Ellis (1♀, DEBU).

POLAND. no locality, 17.XII.1969, G.E. Moorehead (23♀♀ and 11♂♂, USNM).

RUMANIA. no locality, VI.1968, G.E. Moorehead (2♀♀ and 2♂♂, USNM).

AUSTRIA. no locality, VI.1968, G.E. Moorehead (4♀♀ and 2♂♂, USNM).

YUGOSLAVIA. no locality, 18.VIII.1967, T.L. Burger (12♀♀ and 3♂♂, USNM); no locality or date, P. Bjegovic (5♀♀, USNM).

ITALY. Rome, 17.V.1965, J.J. Drea (1♀, USNM).

FRANCE. Nanterre, 7.VII.1964, G.W. Angalet, and 28.V.1965, R.I. Sailer (2♀♀, USNM); Tours, 27.VI.1968, L. Dureseau (10♀♀ and 5♂♂, USNM) and 16.VI.1970 (4♀♀, USNM).

USA. **Michigan.** *Allegan Co.*: 29.IV.1968, T.L. Burger (3♀♀, USNM); *Berrien Co.*: Bertrand township, 3.VII.1975, P.R. DeWitt (2♀♀ and 2♂♂, USNM); Niles, 6.VII.1967, 2.X.1967, 10.VII.1969, 12.VI.1970, H. Maltby, T.L. Burger, F. Wilkinson, G.E. Moorehead (41♀♀ and 14♂♂, USNM), 1975 (5♀♀, USNM), 1977 (11♀♀ and 7♂♂, CNC); *Branch Co.*: 1975 (23♀♀, USNM); *St. Clair Co.*: 1975 (15♀♀, USNM). **Maryland.** *Baltimore Co.*: 1975 (18♀♀, USNM); *Washington Co.*: 25.VII.1975, P.R. DeWitt (2♀♀ and 2♂♂, USNM), 1975 (14♀♀, USNM). **New York.** *Ontario Co.* 1975 (13♀♀, USNM). **North Carolina**. *Granville Co.* 17.v.1991, D.I. Puttler (4♀♀ and 1♂, CNCI); *Rowan Co.* 16.v.1991 (15♀♀ and 3♂♂, CNCI). **Pennsylvania**. *Armstrong Co.*: 25.VII.1975, P.R. DeWitt (3♀♀ and 1♂, USNM), 1975 (17♀♀, USNM). **West Virginia**. *Mason Co.*, 1975 (19♀♀, USNM).

Hosts and Biology. Chrysomelidae: *Oulema melanopus* (L.) [cereal leaf beetle], *O. gallaeciana* (Heydon) (from Tours), *Oulema collaris* (Say), *Lema trilineata* Oliver (Anderson and Paschke 1969), *L. trilineata trivittata* (Say) (Maltby *et al.* 1971), *L. lichenis* Voet. (Bakkendorf 1970; Pavlov 1981), and *L. cyanella* (L.) (Miczulski 1973).

A. flavipes was imported into North America in 1966 for biological control of *O. melanopus* and the first evidence of establishment was obtained in 1968 (Maltby *et al.* 1971). North American material originated from specimens collected in several European countries (Dysart 1971; Miczulski 1973). The specimens examined by me from Poland, Austria, Rumania, Yugoslavia, Italy, Canada and USA were all reared from *O. melanopus*.

Comments. *Anaphes flavipes* belongs to a large complex of very similar species within the *fuscipennis* group, most of which were described by Debauche, Girault and Soyka. All of the species have 2 sensory ridges on F3-6 at least, and the fore wing similar in shape and coloration (posterior margin rimmed with brown). The three described native species that belong to this complex in North America, *A. behmani*, *A. hercules*, *A. nigrellus*, and those described from Europe have been differentiated on minor differences in proportions of the female flagellomeres, such as the length of F2 relative to F3, club length relative to F5 and F6, and pattern of microtrichia on the fore wing (Debauche 1948; Girault 1929). It appears that F2 and the club are the only flagellomeres that vary among the species, F1 and F3-6 being approximately the same in all of

them. There also appears to be considerable intraspecific variation in the length of F2 in at least one species, *A. nigrellus*, and this is correlated with the number of sensory ridges on F2 (0, or 1 - 2).

Hosts have been recorded for only two of the North American species - *A. nigrellus* and *A. behmani* (host possibly incorrect for the latter), and almost none of the species described by Debauche or Soyka. Most of the species, such as those of Soyka, were described from limited material and their specific status is doubtful. Much more material must been studied to assess variation and, most importantly, additional reliable host records obtained before these names can be applied meaningfully. Experimental rearing of a species from different hosts to determine if host-induced structural variation occurs, and cross breeding parasites from different hosts would be very desirable. If this is done it is likely that many more synonyms of *A. flavipes* will eventually be found among the nominal species proposed by Soyka, at least.

Because of its potential as a biological control agent there is a considerable literature, including at least one thesis (Barton 1968) referring to *A. flavipes*. The reference to *A. flavipes* in Graham (1982: 208) is accidental; it refers correctly to *A. auripes* Walker.

Anaphes behmani Girault
(Figs. 25, 42)

Anaphes behmani Girault 1929: 14; Burks 1979: 1029; Collins and Grafius 1983: 2;
Mymar behmani; Soyka 1949: 331; Peck 1951: 416: Peck 1963: 39.

Type material. LECTOTYPE ♀ (USNM), here designated. On slide labelled: 1."Emerged July 12 from larvae of *Dibolia borealis*" [in pencil]. 2." Type No. 20015 U.S.N.M.". 3."LECTOTYPE ♀ *Anaphes behmani* Girault des. Huber 1987". 4."*Anaphes behmani* Girault ♂ ♀ types. *behmani* Ithaca, N.Y.". The lectotype is in good condition under 1 coverslip with 2 other specimens. It is the specimen which is mounted ventral side up with head detached and face up. PARALECTOTYPES, here designated: 4♀♀ and 3♂♂. One somewhat shrivelled female and a headless male are under the same coverslip as the lectotype. Three females and 1 male are under 1 coverslip on a second slide with same data as lectotype except the date given is July 4 and the specimens are labelled as cotypes. The specimens on the second slide are all more or less broken and partly crushed.

Girault's (1929) key constitutes the only description of this species. He did not state how many specimens he had examined nor did he give any locality data. The information given here is taken from the slides examined. The species was incorrectly entered in the Type Book of the U.S. National Museum as a manuscript species.

Diagnosis. Female. *Anaphes behmani* is part of a species complex including *A. flavipes*, *A. nigrellus* and *A. hercules*. It differs from *A. hercules* and *A. nigrellus* by the absence of sensory ridges on F2 (present in the other two). I cannot distinguish it morphologically from *A. flavipes*.

Description. Female. Colour. (only the type slides are available so colour cannot be described).

Body length. (estimated from slide-mounted lectotype). About 440µ.

Head. Head width 216 (n=1); occipital suture represented by line extending ventrally to level of ventral margin of foramen magnum. Length of antennal articles (n=3): radicle+scape 93 (90-99); pedicel 43 (42-44); F1-F6 22 (21-22), 42 (42-43), 59 (54-66), 59 (56-66), 60 (55-64), 56 (53-61); club 107 (106-107). F3-F6 each with 2 sensory ridges (Fig. 42).

Mesosoma. Mesoscutum width 162 (n=1).

Wings. Fore wing length 604 (583-627, n=3), width 88 (73-100), posterior margin very slightly concave (Fig. 25); length of marginal space 358 (310-400); FWL/FWW 7.0 (6.3-8.3); LMC about 135 (122-143) about 1.5 times wing width. Hind wing length 579 (556-602), width 21 (20-24); LMC 96 (91-101); LMC/HWW about 4.6.

Metasoma. Ovipositor length 209 (202-214, n=3), about 1.1 times hind tibial length, extending anteriorly at most to base of middle coxa.

Male. Similar to female. Length of antennal articles (n=2): radicle+scape 78 (77-79); pedicel 40 (38-41), F2-F11 61 (60-63), 60 (57-63), 60 (56-63), 58 (54-61), 59 (58-59), 58 (57-59), 57 (57-58), 56, - , 61.

Distribution. North America.

Material examined. The type series only was seen.

Hosts and Biology. *Dibolia borealis* Chevrolat (Chrysomelidae). The lectotype slide indicates that the specimen emerged from a larva. This clearly is incorrect because mymarids are all idiobiont egg parasites. It is possible, therefore, that the host record itself is wrong and the mymarid was simply found in a cage in which larvae of *D. borealis* were being reared while the true host was something else. Further rearings of eggs of *D. borealis* are required to confirm the host record.

Comments. The host record of *A. behmani* from *Circulifer tenellus* (Flock *et al.* 1962) is incorrect. I examined slide-mounted voucher specimens (in CISC) and the species concerned is *A. iole*. The host for these specimens was most likely *Lygus* sp. and not *Circulifer*.

I examined specimens reared from *Hypera* by Puttler *et al.* (1973) and consider them to be *A. nigrellus* rather than *A. behmani*. Although the specimens I received from Mr. Puttler were faded and mostly broken; 3 of the 4 reasonably intact females that I slide-mounted had sensory ridges on F2 (as for *A. nigrellus*) and 1 had none on F2 (as for *A. behmani*). If this small sample indicates that the number of sensory ridges on F2 is more variable than presently interpreted then *A. nigrellus* and *A. behmani* could be synonymized on the basis of this feature. Further, if the two species are synonymized then they, in turn, should also be synonymized under *A. flavipes*. For the present, however, I think it best to keep the three species separate on the basis of different hosts.

Review of the described species of *Anaphes (Yungaburra)*.

At present, there are only 7 valid names (6 valid species) that can be referred to *A.* (*Yungaburra*), 3 in Australia and 4 in Argentina. At least 17 undescribed species are reported from New Zealand (Noyes and Valentine 1989), and there are also numerous undescribed species from Australia and southern South America. When these species have been described, the number of species in *A.* (*Yungaburra*) will more approximate that in *A.* (*Anaphes*), especially when the large number of names proposed by W. Soyka is reduced through synonymy.

The following key is modified from the two keys found in Ogloblin (1962) and Huber and Prinsloo (1990), respectively, and the descriptions by Ogloblin (1962). Notes on the species described by Ogloblin (1962) are based on examination of most of the type specimens.

Key to described species of *A.* (*Yungaburra*). Females.

1 Club entire (southern South America) (Fig. 11) 2
- Club divided into 2 articles (Australia) (Fig. 12) 4

2(1) Fore wing relatively wide, FWL/FWW at most 3.1; F2-F4 each with 2 sensory ridges . . . . . *A. amplipennis* Ogloblin
- Fore wing narrower, FWL/FWW at least 3.8; F2-F4 each with 1 sensory ridge at most 3

3(2) FWL/FWW about 4.6 (Fig. 35); F2 with 1 sensory ridge . . . . . *A. nunezi* Ogloblin
- FWL/FWW 3.8-4.1 (Fig. 36); F2 without sensory ridges . . . . *A. pucarobius* Ogloblin

4(1) Sensory ridges on F4-F6 J-shaped (Fig. 12) . . . . . *A. nitens* Girault
- Sensory ridges on F4-F6 straight 5

5(4) F2 with 2 sensory ridges; length/width of F3 or F4 greater than 4.0 . . . . . *A. tasmaniae* Huber and Prinsloo
- F2 usually without sensory ridges, occasionally with 2 sensory ridges on one antenna; length/width of F3 or F4 less than 2.4 . . . . . *A. inexpectatus* Huber and Prinsloo

Anaphes (*Yungaburra*) *amplipennis* Ogloblin

Anaphes (*Austranaphes*) *amplipennis* Ogloblin 1962: 49; De Santis 1967: 108.
Type material. HOLOTYPE ♀ (MLPA) [not examined]. The types of *A. amplipennis* are apparently lost (see *A. pucarobius*, below). The species appears to be distinct based on the description and illustrations provided by Ogloblin (1962). His figure of the holotype antenna has 7 instead of 6 funicular articles. Presumably, article 4 was accidentally drawn twice. Each article except F1 has 2 sensory ridges.

Anaphes (*Yungaburra*) *nunezi* Ogloblin
(Fig. 35)

Anaphes (*Austranaphes*) *nunezi* Ogloblin 1962: 51; De Santis 1967: 109.
Type material. HOLOTYPE ♀ (MLPA). On slide labelled: 1."*Clinomymar* [crossed out in pencil] *Yungaburella* [in pencil] *nuñezi* ♀ A. Ogl. Puerto [crossed out in ink] Bahia Aguírre Tierra del Fuego. 14.ii.1949. Josué Nuñuz leg!". 2."HOLOTYPE *Anaphes* (*Austranaphes*) *nunezi* Ogloblin ♀". The holotype is in good condition, dorsal side up. Ogloblin (1962) described the species from two specimens which I examined.
Descriptive notes. Member of the *amplipennis* group. This species is distinct from the other species described by Ogloblin on the basis of its large size and distribution of sensory ridges on the flagellomeres. There are probably eight sensory ridges on the club, not seven as given by Ogloblin (1962).

Anaphes (*Yungaburra*) *pucarobius* Ogloblin
(Fig. 36)

Anaphes (*Austranaphes*) *pucarobius* Ogloblin 1962: 52; De Santis 1967: 109.
Anaphes (*Austranaphes*) *neuquenensis* Ogloblin 1962: 54; De Santis 1967: 109. **Syn. n.**
Type material. ***Anaphes pucarobius.*** HOLOTYPE ♀ (MLPA). On slide labelled: 1." 1 *Anaphes Austranaphes amplipennis* [crossed out in pencil] ♀ *pucarobius* [poorly written in dark pencil] A. Ogl. Pucará, Lago Lacar, Neuquen. 24 [in pencil] 23.ii.1953 V.K.O., A.A.O.". 2."Holotype *Anaphes* (*Austranaphes*) *pucarobius* Ogloblin ♀". The holotype is in good condition, dorsal side up. The date on the allotype was changed (in pencil) to 23.I.1953. Ogloblin (1962) described this species from one female and one male which I examined. The specimens and data correspond with the description of *A. pucarobius* and are definitely the types of that species. I added a label to each clarifying this because both were sent to me as *A. amplipennis*.
Anaphes neuquenensis. HOLOTYPE ♀ (MLPA). On broken slide labelled (entirely in pencil): 1."*persimilis* [crossed out] *neuquens* ♀ 1955.iii.18 "Holotypus" [followed by something illegible]". 2."3913". 3."♀ *persimilis* 32 [followed by something illegible]". 4."HOLOTYPE *Anaphes* (*Austranaphes*) *neuquenensis* Ogloblin ♀". The holotype is in good condition, dorsal side up. The specimen itself is undamaged though the slide it is on is broken and the pieces have been glued to another slide. Ogloblin (1962) described the species from one female and three males. I examined the holotype female and what must be one of the males. This male is labelled: 1."*persimilis* [in pencil] *Anaphes fimbriatus amplipennis* [crossed out] 30 A. Ogl. *fimbriatus* n.sp. Pucará, Lago Lacar. Terr. N. de Neuquen 24.II.1953 17-17 V.K. y A.A.O.". The date corresponds with one of the dates given in the description of *A. neuquenensis*. I measured the flagellomeres of this specimen and their length correspond well with the original description. Therefore I assume that this specimen is one of the males of *A. neuquenensis* even though there is no mention of this name on the slide. I added a label reading "*Anaphes* (*Austranaphes*) *neuquenensis* Ogloblin ♂" to clarify this. The antenna of this specimen is distinctly shorter than that of the male of *A. pucarobius* and the body is smaller. It may be that the specimen is not the male of *A. neuquenensis* at all but that of a new species, as Ogloblin indicated on the slide. The female corresponds exactly with that of *A. pucarobius* so I have synonymized the two species here. The slight differences given by Ogloblin to separate these two species are mostly due to the different orientation of the two holotypes on their respective slides.
Descriptive notes. Member of the *amplipennis* group. The number of sensory ridges on the female club of both types is difficult to count because the specimens are uncleared. Ogloblin (1962) enumerated seven but there are probably eight.

Anaphes (*Yungaburra*) *nitens* (Girault)
(Figs. 12, 18, 55, 59, 61, 63, 65, 67)

Anaphoidea nitens Girault 1928: 262.
Anaphoidea gonipteri Ferrière 1930: 38.

This species was redescribed by Huber and Prinsloo (1990). It is the type species of *Anaphes* (*Yungaburra*). I have since examined the two slides containing six specimens described by Dahms (1986). The five specimens (4♀♀, 1♂) on the same slide are paralectotypes and a label indicating this has been added to it. The specimens fall close to the upper limits of variation described by

Huber and Prinsloo (1990). In contrast, the specimen from Indooroopilly is smaller (FWL = 860µ, FWW = 273µ) than the lower limits given by Huber and Prinsloo (1990).

A. nitens is apparently widespread in Australia, specimens examined having been collected from Queensland (Indooroopilly), Tasmania (Hobart area) and West Australia (Lower Kalgan River). This species is the mymarid most cited in the literature, with over 100 references, due to its great success in the biocontrol of the eucalyptus snout beetle, *Gonipterus scutellatus* Gyllenhal.

Notes on types of the type species of several synonyms of *Anaphes*

I examined the type material of type species of 9 of the synonyms of *Anaphes*. Graham (1982) examined type material of *Panthus* and *Patasson* and stated that type specimen(s) of *A. punctum* (Shaw) seem to be lost. The types of *A.* (*Austanaphes*) *amplipennis* Ogloblin, are missing, as discussed above. The types of *Clinomymar peyerimhoffi* Kieffer have not yet been located but should be in the Museum National d'Histoire Naturelle, Paris. Some of the type specimens are discussed below with notes on their status and attributes that may help to make the species recognizable.

Anaphes pectoralis (Soyka)
(Figs. 28, 43)

Hofenederia pectoralis Soyka 1946b: 183; Soyka 1949: 338; Schauff 1984a: 48.
Hofenederia pinguicornis Soyka 1949: 392. **Syn. n.**

Type material. ***Hofenederia pectoralis.*** LECTOTYPE ♀ (NHMW), here designated. On slide labelled: 1."*Patasson* [in pencil] *Hofenederia* ♀ *pectoralis* Soyka det Soyka". 2."Co-Type". 3."66". 4."Hundsheim am Fenster-aus Heu 2 Juli 1944-lg Soyka Coll. Soyka In Canadab. 1945". 5."LECTOTYPE *Hofenederia pectoralis* Soyka ♀ des. Huber 1987". The lectotype is in good condition, mounted laterally with head detached and face up. PARALECTOTYPES, here designated, 1♀ (no. 1151, 6.VII.1944) and 1♂ (no. 67, VII.1940). Soyka (1946b) described this species from numerous females and males but did not designate a holotype. Soyka (1949) repeated his description and stated that there was one female type. In Vienna I found only two females, labelled as cotypes, and one male, labelled as a paratype. There is also one female with the same data as the holotype in Washington, D.C. (USNM paratype no. 59430). Because the original description did not specify a holotype, a lectotype is designated here.

Hofenederia pinguicornis. HOLOTYPE ♀ (NHMW) [not examined]. Soyka (1949) described this species from 1 "type" and 10 "cotypes". I consider the "type" to be a holotype designation and the remainder as paratypes. In Vienna I found two females and one male, all with the same label data (except for the sex and number) as follows: 1."*Hofenederia* ♀ [or ♂] *pinguicornis* Soyka". 2."Co-Type". 3."68"(♂), "69"(♀), or "1152"(♀). 4."Hundsheim am Fenster-aus Heu 2 Juli 1944-lg Soyka Coll. Soyka In Canadab. 1945". Two of the specimens also had "*Patasson*" written in pencil on the first label above "*Hofenederia*". The holotype, collected on 10.X.1941, is apparently lost. Although Soyka stated that males were unknown there is at least one in the paratype series.

Descriptive notes. Female. Member of the *crassicornis* group. In almost every respect the same as *A. iole* from North America except for the (incompletely) divided club and somewhat wider wings. Antenna (Fig. 43) with club divided by sulcus extending only about 3/4 distance around its circumference; F3-F6 evenly wide, each with 2 sensory ridges; scape with fine oblique striations on inner surface. Fore wing (Fig. 28) almost hyaline, hind margin without brown border except

at extreme apex; posterior row of microtrichia separated from hind margin by about one microtrichia length; FWL/FWW = 3.54-3.85 (n=2). Ovipositor extending forward to apex or base of middle coxae. Type measurements are given in Appendix II.

Comments. The type specimens of *A. pinguicornis* have a longer basal extension of the ovipositor and relatively shorter F2 than those of *A. pectoralis*. I consider these differences to represent infraspecific variation.

Anaphes hundsheimensis (Soyka)
(Figs. 29, 44)

Fulmekiella ***hundsheimensis*** Soyka 1946b: 184; Soyka 1949: 398; Soyka 1954: 63.

Type material. HOLOTYPE ♀ (NHMW). On slide labelled: 1."*Fulmekiella hundsheimensis* ♀ Soyka Geno-type". 2."Geno-Type". 3."1042". 4."Hundsheim am Fenster-aus Heu 6 Juli 1944-lg Soyka Coll. Soyka In Canadab. 1945". The holotype is in good condition, mounted laterally.

Descriptive notes. Female. Member of the ***crassicornis*** group. Antenna (Fig. 44) with club divided by sulcus extending only about 1/2 distance around its circumference; F4 with 1 sensory ridge, F3, F5 and F6 each with 2 sensory ridges; scape with fine, oblique striations on inner surface. Fore wing (Fig. 29) entirely margined with brown border, slightly lighter on basal half of posterior margin; FWL/FWW = 5.92. Ovipositor extending forward to mid point of fore coxa. Type measurements are given in Appendix II.

Anaphes superadditus (Soyka)
(Figs. 30, 45)

Mariella superaddita Soyka 1950: 123; Annecke and Doutt 1961: 23.

Type material. HOLOTYPE ♀ (NHMW). On slide labelled: 1."*Mariella* ♀ *superaddita* Soyka Type". 2."Type". 3."532". 4."Malkwitz b. Breslau Mai 1934 W. Soyka In Canadabalsam.". The holotype is in good condition, mounted laterally.

Descriptive notes. Female. Member of the *crassicornis* group. Somewhat similar to *A. maialis* Debauche which has two sensory ridges on F2. Antenna (Fig. 45) with club divided by a complete sulcus; F2 with 1 sensory ridge, F3-6 each with 2 sensory ridges; scape with oblique, rather faint striations. Fore wing (Fig. 30) entirely margined with brown except basal half of posterior margin; FWL/FWW=5.33. Ovipositor not produced beneath mesosoma; extending only to apex of hind coxa. Type measurements are given in Appendix II.

Anaphes stubaiensis (Soyka)
(Figs. 27, 46)

Fulmekiella stubaiensis Soyka 1949: 417; Annecke and Doutt 1961: 23.
Antoniella stubaiensis; Soyka 1950: 121.
Anaphoidea stubaiensis; Graham 1982: 212.

Type material. HOLOTYPE ♀ (NHMW). On slide labelled: 1."*Antoniella* ♀ *stubaiensis* Soyka Type". 2."Type". 3."1097". 4."Krössbach (Ranalter) am Fenster-aus Heu 15.Juli 1945 lg Soyka Coll. Soyka In Canadab. 1945". In good condition, mounted laterally with head detached and face

up, and one antenna under separate cover slip. In Vienna I found eight other specimens, each on a slide, which must all be considered as paratypes. All were collected at Krössbach but with the following numbers, dates and mostly incorrect type labels: 1098, 15.VII.1945, type (♂); 91, 11.VII.1945, cotype (♀); 92, 29.VII.1945, co-type (♂): 1099, 26.VI.1947 co-type (♀); 1100 and 1101, VII.1947, paratypes (2♂♂); 1102, 29.VII.1945 (1♂); 1103, 7.VII.1945 (1♀).

Descriptive notes. Female. Member of the ***crassicornis*** group. Antenna (Fig. 46) with club completely divided, although the suture is less distinct on one side than the other; F4 without sensory ridges, F3, F5 and F6 each with 2 sensory ridges; scape coarsely, almost transversely striate-imbricate on inner surface. Fore wing (Fig. 27) hyaline on posterior margin basally and apically except for a short brown stretch subapically; FWL/FWW=4.28-4.72 (n=5). Ovipositor extending forward almost as far as posterior margin of prosternum. Type measurements are given in Appendix II.

Comments. This species is almost identical to *A. collinus* Walker, as redescribed by Graham (1982). I have not synonymized *A. stubaiensis* with *A. collinus* because I have not seen the holotype of *A. collinus*. The species is also remarkably similar to *A. pallipes* (Ashmead). The wings of the holotype of *A. pallipes* are difficult to compare with other specimens because of their poor orientation. A specimen of *A. pallipes* from Connecticut, reared supposedly from *Ragoletis pomonella* (Walsh), has slightly wider wings than *A. stubaiensis* but is otherwise the same. Soyka (1949) originally described this species as *Fulmekiella* and later (Soyka 1950) made it the type species of *Antoniella*.

Anaphes wolfsthali (Soyka)
(Figs. 31, 47)

Stammeriella wolfsthali Soyka 1950: 120.

Type material. HOLOTYPE ♀ (NHMW). On slide labelled: 1."*Stammeriella* ♀ *wolfsthali* Soyka Genotype". 2."G.Type". 3."1142". 4."Wolfsthal, Rehfeld 27. Sept. 1941 lg Soyka In Canadab. 1941". The holotype is in moderately good condition, mounted dorsal side up with air bubbles in much of body; one fore wing, both antennae beyond pedicel, and right fore tarsus detached; club from one antenna missing.

Descriptive notes. Member of *crassicornis* group. Antenna (Fig. 47) with club barely divided by a trace of an incomplete sulcus extending only about half way around circumference; F4 with 1 sensory ridge, F5 and F6 each with 2 sensory ridges; scape with faint, oblique striations. Fore wing (Fig. 31) with marginal space extending almost entire wing length; posterior margin hyaline on apical one third; posterior row of microtrichia separated from hind margin by about 1 microtrichia length; FWL/FWW=4.87. Ovipositor extending forward to mouth parts (when head vertical). Type measurements are given in Appendix II.

Comments. This species exemplifies the problems of assigning unequivocally some species to a particular species group. Although the funicle resembles that of *A. fuscipennis* (in the *fuscipennis* group) I prefer to place *A. wolfthali* in the *crassicornis* group on the basis of the slightly and faintly divided club and the extremely long basal extension of the ovipositor.

Anaphes fabarius (Rondani)
(Figs. 34, 50)

Flabrinus fabarius Rondani 1877: 180; Bouček 1974: 248.

Type material. LECTOTYPE ♀ (MZUF), designated by Bouček (1974). On card point labelled: 1."LECTOTYPE" [small round white label with violet border]. 2."*Mimar fabarius*"[specific epithet not clearly legible]. 3."Lectotypus ♀ of *Flabrinus fabarius* Rondani 1877. = *Anaphes fabarius* (Rnd.) Bouček det. 1972." 4."60.". The lectotype is in reasonable condition, glued on its right side with wings, except for the basal half of the left hind wing, detached and glued next to the body. The left antenna is detached beyond the scape. The right antenna is detached beyond the radicle, and the scape, pedicel, F1, and F6 are missing; the flagellum is also broken between F4 and F5. Remaining parts of both antennae are glued next to the body.

Comments. Bouček (1974) correctly placed this species in *Anaphes*. I unglued the specimen to prepare one pair of wings and one antenna for illustration and to examine the length of the ovipositor which was largely hidden in glue. The specimen belongs to the *crassicornis* group on the basis of the almost completely divided club and the very long ovipositor extending to the base of the fore coxae.

Redescription. Colour. Uniformly very dark brown. Mouthparts and legs amber except for apical tarsomere of each leg, basal half of fore and middle femur, and hind femur which are brown. Scape and pedicel amber coloured laterally and ventrally. Basal half of ovipositor (under mesosoma) pale yellow. Fore and hind wings with faint uniform brown suffusion, both with anterior and posterior margins narrowly brown.

Total body length. 891µm. Club divided by a rather faint suture encircling only 3/4 of the club's circumference (Fig. 50). Inner surface of scape apparently smooth. Ovipositor extending forward almost to base of fore coxae. Type measurements given in Appendix II.

Anaphes intermedius (Soyka)
(Figs. 32, 48)

Ferrierella intermedia Soyka 1949: 344.

Type material. HOLOTYPE ♀ (NHMW). On slide labelled: 1."*Ferrierella* ♀ *intermedia* Soyka". 2."Type". 3."874". 4."Jettchen Hof b. Malchin Mecklenburg am Fenster Aug. 1936 lg Stammer In Canadab. 1941". The holotype is in good condition, mounted laterally. Soyka (1949) stated that there was one female and that males were unknown. In his collection there are three specimens (in addition to the holotype) which cannot be considered as part of the original type series. They are all from Hundsheim, as follows: no. 59 and no. 60, 26.VII.1943, paratype (1♀ and 1♂); 2.X.1941, type (1♂). The first two were collected "am fenster" and the latter was collected "am fenster Luzerne Heu". The USNM has two females with the same data as the holotype but collected in 1935. All are in good condition.

Descriptive notes. Female. Member of the *fuscipennis* group. Scape apparently smooth but trace of oblique sculpture present. Hind margin of fore wing pale brown in apical half. Base of ovipositor extending to base of mid coxa. Type measurements are given in Appendix II.

Anaphes medius (Soyka)
(Figs. 33, 49)

Anaphes medius Soyka 1946a: 40.
Synanaphes medius (Soyka) 1949: 334; Annecke and Doutt 1961: 20.
Anaphes ranalteri Soyka 1946b: 181. **Syn. n.**
Synanaphes ranalteri (Soyka) 1949: 333; Annecke and Doutt 1961: 20.
Synanaphes lacensis Soyka 1949: 335. **Syn. n.**
Anaphes (*Anaphes*) *fuscipennis sensu* Debauche 1948: 159.

Type material. ***Anaphes medius.*** HOLOTYPE ♀ (NHMW). On slide labelled: 1."*Synanaphes medius* ♀ Soyka". 2."Type". 3."1147". 4." Hundsheim am Fenster aus Heu 7 Juli 1943 lg Soyka Coll. Soyka In Canad. 1944". The holotype is in good condition, mounted laterally. Soyka (1946a) described this species from 1 female. Soyka (1949) redescribed the species and designated another female (no. 1146, 2.X.1941) and a male (no. 1145, 26.VII.1943) as "co-type" and "type", respectively. I examined both of these specimens. Neither specimen can be considered as type material (ICNZ rule 73(a)ii). There is one female from "Jettchenhof Malchin Mecklenburg" in the USNM. In the redescription, Soyka evidently had the wrong data for the cotype and quoted the date of collection of the holotype again.

Anaphes ranalteri. HOLOTYPE ♀ (NHMW). On slide labelled: 1." *Synanaphes ranalteri* ♀ Soyka Geno-Type". 2."Genotype". 3."1149". 4."Krössbach-Stubaital 12. Sept. 1946 Neustift-Tirol lg Soyka-Coll Soyk In Canad. 1946". The holotype is in good condition, mounted laterally. Soyka (1946b) stated that there was only one specimen, a female, and that the male was unknown. The original description has 1945, instead of 1946, as the collection date for this specimen. In his redescription, Soyka (1949) stated that there were 10 cotypes and males were unknown. I found only one female and three males besides the holotype in Vienna. Three of these specimens evidently formed part of Soyka's so-called co-typical series. They are labelled: no. 51, 5.IX.1946 (female cotype); no. 50, 27.VIII.1947 (male paratype); no.1148, 27.VIII.1947 (male genotype). The fourth slide, no. 1150, 27.VIII.1947 (male), was not labelled as a type. None of these specimens can be considered part of the type series (ICZN rule 73(a)ii). I did not locate the remaining six "co-types".

Anaphes lacensis. HOLOTYPE ♀ (NHMW). On slide labelled: 1."*Synanaphes* ♀ *lacensis* Soyka Type". 2."Type". 3."1144". 4."Jois, Neusiedlersee 7.Okt.1941 Soyka lg In Canadab. 1941". The holotype is in good condition, mounted laterally.

Descriptive notes. Female. Member of the *fuscipennis* group. Similar to *A. iole* Girault reared from *Lygus*. Antenna (Fig. 49) with club entire; F3-6 evenly wide, each with 2 sensory ridges; scape with fine, oblique striations on inner surface (cf. Soyka 1949). Fore wing (Fig. 33) almost hyaline, posterior margin narrowly rimmed with light brown at least on apical half of margin (as measured from apex of frenal fold); posterior row of microtrichia separated from posterior margin by about one half their own length; FWL/FWW = 5.0-5.4 (n=3). Ovipositor extended forward to base or apex of middle coxa. Type measurements are given in Appendix II.

Comments. I examined 18 slides (12♀♀ and 6♂♂) labelled as *A. fuscipennis* by Debauche and compared them with the types of *A. medius*. Nine of the females are definitely members of *A. medius*. All but one were collected in Belgium: Tervuren, 31.V.1945 and 23.VIII.1944; Héverlé, 1.X.1941;Campenhout, 5.IX.1941; Eegenhoven, 11.V.1942; and Forêt de Loverval, 10.VIII.1941. One was collected at Passo San Bernardino, 1500m, 20.VIII.1960 [Switzerland]. I am not certain about the placement of the three remaining females (Tervuren, 16.V.1945, no. 293; Revoz, Mirwart, M. Rémont, 19.VI.1945; and Eegenhoven, IX.1959). The males appear to represent a

mixture of species none of which seem to be members of *A. medius*. Graham (1982) suggested that *A. fuscipennis sensu* Debauche (1948) was possibly a synonym *A. ?brevis* Walker but because he could not find any type material of *A. brevis*, he was unable to confirm this.

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Checklist of *Anaphes* species.
(Gender: masculine)

The purpose of this list is to try and forestall further description of homonyms and to summarize the few, published, definite synonyms. All known names published before 1991 that have been referred to *Anaphes s.l.* are included. The genus or subgenus in which each species was originally placed is given in parentheses if this differs from *Anaphes* or its nominal subgenus. Species originally described as *Anaphes s.l.* that have been transferred to other genera are listed separately, together with the genus to which they have been transferred. In these cases, only the reference giving the transfer is cited, unless it is a new combination. Unavailable names are listed separately at the end. Doubtful synonyms proposed by previous authors e.g. Graham (1982) and Bakkendorf (1964) are excluded. The source of synonyms not proposed in the present paper is given in parentheses. There are 3 secondary homonyms in the list: *A. angustipennis* (Soyka) nec Debauche, *A. crassicornis* (Soyka) nec Walker, and *A. longicornis* (Soyka) nec Walker. It is pointless to propose replacement names for these until the European species are carefully revised. There are already enough names that need sorting out and adding more now would be counterproductive.

acutipennis (Soyka) 1949: 315 (*Mymar*)
acutiventris (Soyka) 1949: 419 (*Yungaburra*)
additus (Soyka) 1949: 354 (*Anaphoidea*)
aequipennatus (Soyka) 1953a: 37 (*Anaphoidea*)
aequus (Soyka) 1953a: 37 (*Anaphoidea*)
aestivus (Soyka) 1950: 121 (*Antoniella*)
alaskae Annecke and Doutt 1961: 47
albipes (Soyka) 1949: 355 (*Anaphoidea)*
amplipennis Ogloblin 1962: 49 (*Austranaphes*)
angustipennis Debauche 1948: 184 (*Patasson*)
angustipennis (Soyka) 1949: 339 (*Ferrierella*)
anomocerus, see *iole*; syn. of *iole* (Huber and Rajakulendran 1988)
antoniae (Soyka) 1955: 463 (*Mymar*)
apilosus (Soyka) 1949: 356 (*Anaphoidea)*
archettii Ghidini 1945: 39
arcuatus (Soyka) 1953a: 38 (*Anaphoidea*)
arenbergi Debauche 1948: 166
aries Debauche 1948: 1968
ater (Soyka) 1949: 400 (*Fulmekiella*)
aterrimus (Soyka) 1949: 399 (*Fulmekiella*)
atomarius (Brèthes) 1913: 100 (*Anaphoidea*)
auripes Walker 1846: 52
australia (Girault) 1920: 97 (*Anaphoidea*)
autumnalis Förster 1847: 212
avalae (Soyka) 1955: 464 (*Mymar*)
balteatus (Soyka) 1949: 401 (*Fulmekiella*)
basalis Förster 1861: 42
behmani Girault 1929: 14

bicolor (Soyka) 1953a: 38 (*Anaphoidea*)
brachygaster Debauche 1948: 176 (*Patasson*)
brevicornis (Soyka) 1949: 316 (*Mymar*)
brevior (Soyka) 1949: 357 (*Anaphoidea*)
brevis Walker 1846: 52
brevitarsis (Soyka) 1949: 340 (*Ferrierella*)
breviventris (Soyka) 1949: 341 (*Ferrierella*)
brunneus (Doutt) 1949: 159 (*Anaphoidea*)
byrrhidiphagus Huber sp.n.
calendrae (Gahan) 1927: 32 (*Anaphoidea*)
calvescens Debauche 1948: 180 (*Patasson*)
campestris (Soyka) 1949: 401 (*Fulmekiella*)
capitulatus (Soyka) 1949: 341 (*Ferrierella*); syn.n. of *fuscipennis*
chrysomelae (Bakkendorf) 1960: 372 (*Anaphoidea*)
ciliatus (Soyka) 1949: 317 (*Mymar*)
collinus Walker 1846: 52
communis (Soyka) 1949: 358 (*Anaphoidea*)
comosipennis Girault 1917: 17
compressus (Soyka) 1949: 360 (*Anaphoidea*)
confertus (Doutt) 1949: 155 (*Anaphoidea*)
congener Förster 1861: 42
conotracheli Girault 1905: 220
consimilis (Soyka) 1949: 402 (*Fulmekiella*)
crassicornis (Walker) 1846: 52 (*Panthus*)
crassicornis (Soyka) 1949: 318 (*Mymar*)
crassipennis Soyka 1946a: 41
crassipilis (Soyka) 1949: 360 (*Anaphoidea*)
crassus (Soyka) 1953a: 38 (*Anaphoidea*)
cultripennis Debauche 1948: 162
debilipennis (Soyka) 1949: 361 (*Anaphoidea*)
declinatus (Soyka) 1950: 121 (*Antoniella*)
depressus (Soyka) 1954: 63 (*Anaphoidea*); ?*lapsus* for *compressus*
dessarti (Mathot) 1969: 18 (*Patasson*)
devillei Debauche 1948: 177 (*Patasson*)
devius (Soyka) 1949: 403 (*Fulmekiella*)
diana (Girault) 1911a: 215 (*Anaphoidea*)
differens (Soyka) 1949: 363 (*Anaphoidea*)
dilatatus (Soyka) 1949, 342 (*Ferrierella*)
discolor (Soyka) 1949: 404 (*Fulmekiella*)
discolorsimilis (Soyka) 1950: 122 (*Antoniella*)
distinctus (Soyka) 1953a: 38 (*Anaphoidea*)
dorcas Debauche 1948: 179 (*Patasson*)
dubius (Soyka) 1949: 405 (*Fulmekiella*)
duplicatus (Soyka) 1953b: 53 (*Anaphoidea*)
dytiscidarum Rimskii-Korsakov 1920: 7
elegans (Soyka) 1955: 465 (*Mymar*)
elongatus (Soyka) 1949: 390 (*Hofenederia*)

ensipennis (Soyka) 1949: 320 (*Mymar*)
euryale Debauche 1948: 174 (*Patasson*)
exiguosimilis (Soyka) 1953b: 53 (*Anaphoidea*)
exiguus (Soyka) 1949: 363 (*Anaphoidea*)
fabarius (Rondani) 1877: 180 (*Flabrinus*)
falsus (Soyka) 1953b: 53 (*Anaphoidea*)
fennicus (Soyka) 1955: 465 (*Mymar*)
ferrierei (Soyka) 1946b: 180 (*Mymar*)
filicornis (Soyka) 1949: 343 (*Ferrierella*); syn.n. of *fuscipennis*
flavicornis (Soyka) 1949: 365 (*Anaphoidea*)
flavipennis (Soyka) 1954: 64 (*Anaphoidea*)
flavipes (Förster) 1841: 43 (*Gonatocerus*)
flavitarsis (Soyka) 1949: 364 (*Anaphoidea*)
flavus (Soyka) 1949: 321 (*Mymar*)
fortipennis (Soyka) 1953b: 53 (*Anaphoidea*)
fuscipennis Haliday 1833: 346
gabitzi (Soyka) 1953b: 54 (*Anaphoidea*)
galtoni Girault 1912b: 152 (*Anaphoidea*)
gauthieri Debauche 1948: 171
gerrisophagus (Doutt) 1949: 156 (*Anaphoidea*)
globosicornis (Soyka) 1949: 322 (*Mymar*)
globosus (Soyka) 1949: 366 (*Anaphoidea*)
gonipteri (Ferrière) 1930: 38 (*Anaphoidea*); syn. of *nitens* (Girault 1930)
gracilior (Soyka) 1949: 323 (*Mymar*)
gracillimus (Soyka) 1955: 466 (*Mymar*)
hercules Girault 1911e: 285
heterotomus (Mathot) 1969: 16 (*Patasson*)
hundsheimensis (Soyka) 1946b: 184 (*Fulmekiella*)
inexpectatus Huber and Prinsloo 1990: 340
intermedius (Soyka) 1949: 344 (*Ferrierella*)
iole Girault 1911e: 284
iole anomocerus Girault 1929: 13
kressbachi (Soyka) 1949: 367 (*Anaphoidea*)
lacensis (Soyka) 1949: 335 (*Synanaphes*); syn. n. of *medius*
lameerei Debauche 1948: 182 (*Patasson*); syn. of *dana* (Schauff 1984b)
laticornis (Soyka) 1949: 345 (*Ferrierella*)
latipennis Walker 1846: 52
latipterus Boţoc 1962: 111
latus (Soyka) 1949: 406 (*Fulmekiella*)
lemae Bakkendorf 1970: 153; syn. n. of *flavipes*
leonhardwitzi (Soyka) 1949: 324 (*Mymar*)
leptoceras Debauche 1948: 187 (*Patasson*)
linearis (Soyka) 1949: 407 (*Fulmekiella*)
lineipennis (Soyka) 1949: 368 (*Anaphoidea*)
linnaei (Girault) 1912b: 153 (*Anaphoidea*)
longiclavus (Doutt) 1949: 158 (*Anaphoidea*)
longicornis Walker 1846: 52

longicornis (Soyka) 1949: 407 (*Fulmekiella*)
longior (Soyka) 1949: 369 (*Anaphoidea*)
longipennis (Soyka) 1949: 370 (*Anaphoidea*)
longipilis (Soyka) 1954: 60 (*Anaphoidea*)
longispinosus (Soyka) 1955: 467 (*Mymar*)
lucidus (Soyka) 1949: 370 (*Anaphoidea*)
luna (Girault) 1914: 109 (*Anaphoidea*)
luteicornis (Soyka) 1955: 467 (*Mymar*)
maculatus (Soyka) 1949: 345 (*Ferrierella*); syn. n. of *fuscipennis*
maculicornis (Soyka) 1949: 390 (*Hofenederia*)
maialis Debauche 1948: 185 (*Patasson*)
malchinensis (Soyka) 1949: 392 (*Hofenederia*)
malkwitzi (Soyka) 1949: 408 (*Fulmekiella*)
medioacutus (Soyka) 1954: 60 (*Anaphoidea*)
medius Soyka 1946a: 40
minimus (Soyka) 1949: 371 (*Anaphoidea*)
minor (Soyka) 1949: 409 (*Fulmekiella*)
mirabilis (Soyka) 1955: 468 (*Mymar*)
nemorosus (Soyka) 1954: 60 (*Anaphoidea*)
neobrevior (Soyka) 1954: 60 (*Anaphoidea*)
neodistinctus (Soyka) 1954: 60 (*Anaphoidea*)
neoflavus (Soyka) 1949: 372 (*Anaphoidea*)
neopratensis (Soyka) 1946b: 182 (*Ferrierella*); syn. n. of *fuscipennis*
neoserenus (Soyka) 1955: 469 (*Mymar*)
neospecialis (Soyka) 1955: 469 (*Mymar*)
neuquenensis Ogloblin 1962: 54 (*Austranaphes*); syn. n. of *pucarobius*
neustadti (Soyka) 1949: 373 (*Anaphoidea*)
niger (Soyka) 1949: 411 (*Fulmekiella*)
nigerrimus (Soyka) 1949: 410 (*Fulmekiella*)
nigrellus Girault 1911e: 282
nigricornis (Soyka) 1949: 325 (*Mymar*)
nipponicus Kuwayama 1932: 93
nitens (Girault) 1928: 262 (*Anaphoidea*)
nunezi Ogloblin 1962: 51 (*Austanaphes*)
obscurus (Soyka) 1949: 374 (*Anaphoidea*)
obsoletus (Soyka) 1954: 61 (*Anaphoidea*)
ordinarius (Soyka) 1954: 61 (*Anaphoidea*)
ornatus (Soyka) 1949: 412 (*Fulmekiella*)
ovatus (Soyka) 1949: 413 (*Fulmekiella*)
ovijentatus (Crosby and Leonard) 1914a: 181 (*Anagrus*); syn. of *iole* (Girault 1929)
ovipositor Soyka 1946a: 41
pallidicornis (Soyka) 1949: 415 (*Fulmekiella*)
palliditarsis (Soyka) 1949: 375 (*Anaphoidea*)
pallidus (Soyka) 1949: 414 (*Fulmekiella*)
pallipes (Ashmead) 1887: 193 (*Alaptus*)
pannonicus (Soyka) 1946a: 42 (*Anaphoidea*)
parallelipennis (Soyka) 1949: 415 (*Fulmekiella*)

parciventris (Soyka) 1949: 376 (*Anaphoidea*)
parvus (Förster) 1841: 43 (*Gonatocerus*)
pectoralis (Soyka) 1946b: 183 (*Hofenederia*)
pellucens (Soyka) 1949: 377 (*Anaphoidea*)
perdubius Girault 1916: 6; syn. of *iole* (Girault 1929)
peyerimhoffi (Kieffer) 1913: 101 (*Clinomymar*)
piceicornis (Soyka) 1954: 61 (*Anaphoidea*)
pilicornis (Soyka) 1949: 326 (*Mymar*)
piliscapus (Soyka) 1949: 327 (*Mymar*)
pilosipennis (Soyka) 1949: 328 (*Mymar*)
pilosissimus (Soyka) 1954: 61 (*Anaphoidea*)
pinguicornis (Soyka) 1949: 392 (*Hofenederia*); syn.n. of *pectoralis*
pratensis Förster 1847: 211
pucarobius Ogloblin 1962: 52 (*Austanaphes*)
pulchripennis (Soyka) 1949: 348 (*Ferrierella*)
pullicrurus (Girault) 1910: 252 (*Anaphoidea)*
punctum (Shaw) 1798: 189 (*Ichneumon*)
quadraticornis (Soyka) 1949: 329 (*Mymar*)
ranalteri (Soyka) 1946b: 181 (*Synanaphes*); syn. n. of *medius*
rectipennis (Soyka) 1949: 378 (*Anaphoidea*)
reductus (Soyka) 1949: 379 (*Anaphoidea*)
regulus Walker 1846: 52
relictus (Soyka) 1949: 393 (*Hofenederia*)
rotundipennis (Soyka) 1949: 394 (*Hofenederia*)
rufus (Soyka) 1949: 416 (*Fulmekiella*)
saintpierrei Girault 1913: 117
schellwieniens Meunier 1901: 284
semiflavus (Soyka) 1949: 380 (*Anaphoidea*)
semimedius (Soyka) 1949: 381 (*Anaphoidea*)
serbicus (Soyka) 1949: 381 (*Anaphoidea*)
serenus (Soyka) 1955: 471 (*Mymar*)
sibbei (Soyka) 1954: 64 (*Anaphoidea*)
siegerfeldi (Soyka) 1955: 472 (*Mymar*)
silesicus (Soyka) 1946a: 42 (*Anaphoidea*)
similis (Soyka) 1949: 383 (*Anaphoidea*)
sinipennis Girault 1911e: 280
sordidatus (Girault) 1909: 169 (*Anaphoidea*)
speciosior (Soyka) 1954: 61 (*Anaphoidea*)
speciosus (Soyka) 1955: 472 (*Mymar*)
spinosus (Soyka) 1949: 330 (*Mymar*)
splendens Meunier 1901: 284
stammeri (Soyka) 1949: 349 (*Ferrierella*); syn. n. of *fuscipennis*
stratipennis (Soyka) 1954: 62 (*Anaphoidea)*
stubaiensis (Soyka) 1949: 417 (*Fulmekiella*)
stygius Debauche 1948: 165
sulphuripes (Soyka) 1949: 330 (*Mymar*)
superadditus (Soyka) 1950: 123 (*Mariella*)

swiedecki (Soyka) 1953b: 54 (*Anaphoidea*)
tarsalis Mathot 1969: 19
tasmaniae Huber and Prinsloo 1990: 338
tenuipennis (Soyka) 1949: 350 (*Ferrierella*)
tenuis (Soyka) 1949: 395 (*Hofenederia*)
thoracicus (Soyka) 1955: 473 (*Mymar*)
timidus (Soyka) 1950: 124 (*Mariella*)
valkenburgicus (Soyka) 1949: 385 (*Anaphoidea*)
variatus (Soyka) 1949: 384 (*Anaphoidea*)
varicolor (Soyka) 1949: 350 (*Ferrierella*)
vulgaris (Soyka) 1946a: 42 (*Anaphoidea*)
vulgarisimilis (Soyka) 1954: 62 (*Anaphoidea*)
weidenhofi (Soyka) 1954: 62 (*Anaphoidea*)
wertaneki (Soyka) 1955: 474 (*Mymar*)
wolfsthali (Soyka) 1950: 120 (*Stammeriella*)
wratislawensis (Soyka) 1954: 62 (*Anaphoidea*)

Species transferred from *Anaphes* to other genera.

bicolor (Dozier) (*Schizophragma*), Huber 1987: 834
cinctiventris (Girault) (*Erythmelus*), Girault 1929: 7
elongatus (Risbec) (*Anagrus*), Ghesquière 1951: 344
foersteri (Ratzeburg) 1848: 141 (*Anagrus*) **comb. n.**
gracilipes (Girault) (*Erythmelus*), Girault 1929: 7
gracilis (Howard) (*Erythmelus*), Girault 1929: 8
harveyi (Girault) (*Erythmelus*), Girault 1912b: 151 **comb. n.**
himalayana (Mani and Saraswat) (*Anagroidea*) Subba Rao and Hayat 1983: 131
kantii (Girault) (*Erythmelus*) Girault 1915: 179
laplacei (Girault) (*Erythmelus*) Girault 1915: 179
latipennis (Crawford) (*Schizophragma*) Ogloblin 1949: 350
mazzinini Girault (*Erythmelus*) Girault 1915: 179 (as *mazzinii*)
mellicornis (Ashmead) (*Amitus*-Scelionidae) Gahan 1927: 39
ovivorus Rondani (*Telenomus*-Scelionidae) Bouček 1974: 273
painei Girault (*Erythmelus*) Girault 1915: 179
picinus (Girault) (*Erythmelus*) Girault 1929: 8
spinozai (Girault) (*Erythmelus*) Girault 1915: 179
tingitiphagus (Soares) 1941: 265 (*Erythmelus*) **comb. n.**
wallacei (Girault) (*Erythmelus*) Girault 1915: 179

Unavailable name

nigroparvus (Soyka) 1954: 63 (*Fulmekiella*), **nom. nud.**

APPENDIX I. Measurements (in μm) of primary types of nominal species of *Anaphes s. s.* (*fuscipennis* group) for North America. Abbreviations used: Fem.=femur; FW=fore wing; HT=holotype; HW=hind wing; L=length; LT=lectotype; Macro. dist.=distance between macrochaetae of marginal vein; ovip.=ovipositor; PLT=paralectotype; Stig.=stigmal vein; Tib.=tibia; Troch.=trochanter; W=width. Many measurements could not be made because parts were missing or not clearly visible. Measurements of structures positioned obliquely or taken from air-dried specimens (*fuscipennis*) are not accurate, and are indicated by "≈". Types of *flavipes*, *iole*, and *sinipennis* are lost, presumably destroyed.

Nominal species	Type	Head W	Mesosoma		Ovip. L.	Ovip./hind tibia
			W	L		
1. *ovijentatus*	LT	-	-	345	401	1.62
2. *anomocerus*	LT	-	-	-	283	1.78
3. *perdubius*	LT	156	129	-	297	1.65
4. *alaskae*	HT	313	-	428	370	1.01
5. *behmani*	LT	194	168	213	215	1.09
6. *hercules*	HT	239	177	292	235	0.84
7. *nigrellus*	HT	253	-	275	214	0.88
8. *fuscipennis*	LT	257	228	297	436	≈1.50
9. *pratensis*	LT	-	-	379	513	1.42
10. *neopratensis*	HT	-	-	422	496	1.33
11. *maculatus*	HT	292	-	331	526	1.73
12. *filicornis*	HT	-	-	350	509	1.50
13. *capitulatus*	HT	-	-	263	377	1.60
14. *stammeri*	HT	-	-	335	464	1.47
15. *byrrhidiphagus*	HT	292	241	≈384	≈301	≈0.79
16. *lemae*	HT	-	-	≈253	-	-

APPENDIX I. - continued.

Nominal species	FW				Total ven. L	Macro. dist.	Stig. L	Marginal space L
	L	W	L/W	LMC				
1. *ovijentatus*	758	199	3.81	113	239	61	45	-
2. *anomocerus*	≈523	102	≈5.13	111	174	48	31	108
3. *perdubius*	617	132	4.67	127	205	60	29	107
4. *alaskae*	923	161	5.73	131	346	96	52	150
5. *behmani*	640	99	6.46	136	208	55	32	93
6. *hercules*	844	150	5.63	128	286	79	39	135
7. *nigrellus*	700	117	5.98	126	244	60	41	98
8. *fuscipennis*	≈802	≈168	4.76	≈238	≈238	-	-	≈99
9. *pratensis*	1034	215	4.81	193	336	88	43	148
10. *neopratensis*	1096	247	4.44	197	343	98	38	170
11. *maculatus*	904	212	4.26	167	276	69	34	160
12. *filicornis*	997	218	4.57	194	298	81	34	150
13. *capitulatus*	704	147	4.79	155	205	52	29	103
14. *stammeri*	888	189	4.70	159	281	73	39	140
15. *byrrhidiphagus*	1344	373	3.60	166	392	102	49	191
16. *lemae*	727	109	6.67	145	257	62	42	103

APPENDIX I. - continued.

Nominal species	HW			Ven. L
	L	W	LMC	
1. *ovijentatus*	715	37	109	238
2. *anomocerus*	466	21	81	155
3. *perdubius*	574	-	-	188
4. *alaskae*	901	40	130	330
5. *behmani*	≈560	21	100	185
6. *hercules*	821	37	120	275
7. *nigrellus*	632	25	99	200
8. *fuscipennis*	≈732	≈40	≈129	≈218
9. *pratensis*	987	52	171	337
10. *neopratensis*	1028	51	167	355
11. *maculatus*	854	44	137	269
12. *filicornis*	956	43	158	313
13. *capitulatus*	-	-	-	224
14. *stammeri*	848	-	-	283
15. *byrrhidiphagus*	1219	68	164	404
16. *lemae*	668	28	116	201

APPENDIX I. - continued.

Nominal species	Fore leg								
	Coxa	Troch.	Fem.	Tib.	Tarsus				
					Total	1	2	3	4
1. *ovijentatus*	70	49	169	155	170	45	45	42	33
2. *anomocerus*	-	-	108	110	117	29	32	30	25
3. *perdubius*	≈73	41	130	127	126	38	31	34	25
4. *alaskae*	151	75	238	218	≈200	67	44	38	≈44
5. *behmani*	73	47	128	125	135	43	33	32	28
6. *hercules*	110	58	189	184	177	52	47	42	38
7. *nigrellus*	92	44	164	156	160	51	40	35	32
8. *fuscipennis*	-	-	-	-	≈198	-	≈50	≈40	≈40
9. *pratensis*	≈129	-	≈249	≈222	-	74	47	-	-
10. *neopratensis*	-	-	≈244	≈237	250	94	59	53	47
11. *maculatus*	-	-	≈200	208	204	80	51	47	40
12. *filicornis*	-	-	-	216	241	90	57	50	43
13. *capitulatus*	91	46	165	156	170	62	40	37	33
14. *stammeri*	-	-	205	200	219	82	49	47	40
15. *byrrhidiphagus*	-	73	≈248	257	≈206	64	48	47	45
16. *lemae*	-	-	-	157	150	47	37	36	32

APPENDIX I. - continued.

Nominal species	Middle leg								
	Coxa	Troch.	Fem.	Tib.	Tarsus				
					Total	1	2	3	4
1. *ovijentatus*	61	46	150	206	-	35	47	44	35
2. *anomocerus*	-	-	-	-	-	-	-	-	-
3. *perdubius*	54	40	126	168	129	34	35	28	29
4. *alaskae*	-	75	237	296	209	72	50	45	49
5. *behmani*	57	45	127	173	129	32	33	35	29
6. *hercules*	-	62	193	279	173	45	48	46	36
7. *nigrellus*	≈56	45	159	≈216	152	38	43	38	33
8. *fuscipennis*	-	≈59	≈208	≈257	≈228	-	≈50	≈50	≈40
9. *pratensis*	-	≈66	≈227	322	272	111	62	55	45
10. *neopratensis*	-	-	251	344	261	113	58	53	43
11. *maculatus*	70	56	≈201	-	230	84	56	48	42
12. *filicornis*	87	-	227	313	254	104	61	50	43
13. *capitulatus*	68	-	164	215	173	61	41	37	33
14. *stammeri*	-	-	251	286	244	93	54	52	44
15. *byrrhidiphagus*	101	62	265	343	229	70	55	53	46
16. *lemae*	59	-	-	-	-	-	-	-	-

APPENDIX I. - continued.

Nominal species	Hind leg								
	Coxa	Troch.	Fem.	Tib.	Tarsus				
					Total	1	2	3	4
1. *ovijentatus*	104	62	188	250	167	36	48	47	35
2. *anomocerus*	-	-	-	159	116	18	33	31	25
3. *perdubius*	82	46	146	176	130	27	38	36	27
4. *alaskae*	-	98	306	369	259	98	62	56	48
5. *behmani*	83	53	142	193	130	32	34	34	31
6. *hercules*	120	70	≈188	287	212	55	62	54	41
7. *nigrellus*	90	60	196	244	176	44	51	44	36
8. *fuscipennis*	≈178	69	≈218	≈287	≈238	≈69	≈50	-	-
9. *pratensis*	157	86	291	329	279	115	62	56	49
10. *neopratensis*	166	76	298	371	259	109	59	53	44
11. *maculatus*	147	≈71	247	308	242	92	55	50	42
12. *filicornis*	-	-	≈269	339	264	107	62	53	44
13. *capitulatus*	109	64	195	230	180	64	45	38	31
14. *stammeri*	138	72	246	312	244	95	56	49	44
15. *byrrhidiphagus*	160	83	308	381	264	86	66	61	50
16. *lemae*	-	-	-	-	-	-	-	-	-

APPENDIX I. - continued.

Nominal species	Scape + radicle		Pedicel		Funicle article (no. sensory ridges)					
					1		2		3	
	L	W	L	W	L	W	L	W	L	W
1. *ovijentatus*	-	32	50	34	28	16	50	22	59	26(2)
2. *anomocerus*	-	26	44	31	20	14	27	17	41	23(2)
3. *perdubius*	-	26	46	29	20	14	35	14	48	16(2)
4. *alaskae*	169	40	72	41	35	24	74	25	65	32(1)
5. *behmani*	-	-	-	-	17	14	36	13	63	20(2)
6. *hercules*	153	-	-	-	-	-	-	-(1)	73	-(2)
7. *nigrellus*	146	31	55	28	24	17	60	21(1)	67	23(2)
8. *fuscipennis*	≈99	≈40	≈50	≈40	≈30	≈20	≈89	≈15	≈69	≈15
9. *pratensis*	-	42	69	34			118	19	104	19
10. *neopratensis*	-	-	-	38	36	19	130	17	106	18
11. *maculatus*	139	-	≈60	-	44	18	103	-	89	-
12. *filicornis*	-	38	66	35	32	-	109	18	95	17
13. *capitulatus*	108	30	51	30	34	19	74	15	66	14
14. *stammeri*	-	-	59	-	27	15	-	17	-	17
15. *byrrhidiphagus*	170	43	65	40	25	18	115	24	109	29(2)
16. *lemae*	108	24	48	28	33	21	48	16	66	24(2)
					24	15				

APPENDIX I. - continued.

Nominal species	Funicle article (no. sensory ridges)						Club	
	4		5		6		L	W
	L	W	L	W	L	W		
1. *ovijentatus*	57	30(2)	58	28(2)	61	31(2)	108	-(6)
2. *anomocerus*	30	20	42	22(2)	40	22(2)	86	28(-)
3. *perdubius*	39	16	50	20(2)	49	21(2)	93	30(6)
4. *alaskae*	67	33(1)	61	35(1)	64	39(2)	193	70(6)
5. *behmani*	62	20(2)	60	21(2)	56	21(2)	101	30(6)
6. *hercules*	77	-(2)	74	-(2)	68	-(2)	139	-(6)
7. *nigrellus*	68	23(2)	66	24(2)	66	24(2)	134	34(6)
8. *fuscipennis*	≈69	≈15	≈69	≈20(1)	≈59	30(-)	≈129	45(-)
9. *pratensis*	94	20	84	24(1)	75	34(2)	150	40(6)
10. *neopratensis*	90	19	82	25(1)	80	29(2)	154	58(6)
11. *maculatus*	80	-	76	-(1)	74	-(2)	143	-(6)
12. *filicornis*	88	19	83	22(1)	79	29(2)	148	46(6)
13. *capitulatus*	59	15	58	19(1)	58	23(2)	120	45(6)
14. *stammeri*	74	17	71	22(1)	70	30(2)	145	-(6)
15. *byrrhidiphagus*	100	27(1)	96	31(2)	90	35(2)	174	52(6)
16. *lemae*	67	25(2)	67	25(2)	68	24(2)	124	38(6)

APPENDIX II. Measurements (in µm) of primary types of nominal species of *Anaphes*. Abbreviations used: Fem.=femur; FW=fore wing; HT=holotype; HW=hind wing; L=length; LT=lectotype; Macro. dist.=distance between macrochaetae of marginal vein; ovip.=ovipositor; Stig.=stigmal vein; Tib.=tibia; Troch.=trochanter; W=width. Many measurements could not be made because parts were missing or not clearly visible. Measurements of structures positioned obliquely are not accurate, and are indicated by "≈". The holotypes of *A. amplipennis* and *A. pinguincornis* are lost.

Nominal species	Type	Head W	Mesosoma		Ovip. L.	Ovip./hind tibia
			W	L		
1. *medius*	HT	-	-	320	374	1.36
2. *ranalteri*	HT	-	-	298	315	1.30
3. *lacensis*	HT	-	-	298	337	1.48
4. *pectoralis*	LT	-	-	380	431	1.54
5. *wolfsthali*	HT	-	-	287	653	2.37
6. *hundsheimensis*	HT	-	-	236	340	1.60
7. *superadditus*	HT	-	-	275	216	1.00
8. *intermedius*	HT	-	-	332	349	1.23
9. *stubaiensis*	HT	173	-	225	316	1.92
10. *nunezi*	HT	272	230	389	614	1.91
11. *pucarobius*	HT	256	223	318	320	1.41
12. *neuquenensis*	HT	251	214	306	296	1.14
13. *fabarius*	LT	≈272	≈218	≈327	≈663	≈1.97

APPENDIX II. - continued.

Nominal species	FW				Total ven. L	Macro. dist.	Stig. L	Marginal space L
	L	W	L/W	LMC				
1. *medius*	≈782	156	5.01	137	254	69	32	111
2. *ranalteri*	767	142	5.42	148	239	57	38	128
3. *lacensis*	782	-	-	-	243	61	37	122
4. *pectoralis*	830	235	3.54	134	271	73	36	100
5. *wolfsthali*	906	186	4.87	235	294	87	41	574
6. *hundsheimensis*	614	104	5.92	108	206	53	32	81
7. *superadditus*	620	116	5.33	135	211	57	32	100
8. *intermedius*	823	149	5.52	143	254	68	32	127
9. *stubaiensis*	557	130	4.28	140	192	49	29	94
10. *nunezi*	1206	262	4.60	166	365	90	69	140
11. *pucarobius*	910	242	3.76	188	260	60	54	203
12. *neuquenensis*	935	229	4.08	178	267	64	55	197
13. *fabarius*	949	145	6.54	130	330	83	53	≈330

APPENDIX II. - continued.

Nominal species	HW			Ven. L
	L	W	LMC	
1. *medius*	759	-	-	234
2. *ranalteri*	737	31	127	230
3. *lacensis*	762	37	140	236
4. *pectoralis*	795	42	125	274
5. *wolfsthali*	827	35	160	253
6. *hundsheimensis*	599	19	93	202
7. *superadditus*	-	29	108	-
8. *intermedius*	815	31	130	269
9. *stubaiensis*	527	26	98	178
10. *nunezi*	1097	48	158	340
11. *pucarobius*	862	49	171	240
12. *neuquenensis*	868	44	164	244
13. *fabarius*	949	38	141	310

APPENDIX II. - continued.

Nominal species	Fore leg								
	Coxa	Troch.	Fem.	Tib.	Tarsus				
					Total	1	2	3	4
1. *medius*	-	-	174	170	170	51	43	43	33
2. *ranalteri*	≈92	41	165	157	162	52	43	37	31
3. *lacensis*	-	-	166	152	165	52	44	40	31
4. *pectoralis*	115	50	186	175	198	58	47	50	43
5. *wolfsthali*	-	-	-	-	≈201	-	-	-	-
6. *hundsheimensis*	78	41	136	133	132	38	33	32	29
7. *superadditus*	73	-	144	138	149	39	40	39	33
8. *intermedius*	105	41	183	181	174	52	45	41	33
9. *stubaiensis*	-	-	126	117	118	31	31	31	26
10. *nunezi*	-	68	-	-	215	61	56	59	41
11. *pucarobius*	-	-	182	177	150	-	-	-	-
12. *neuquenensis*	-	-	-	182	≈197	-	-	-	-
13. *fabarius*	-	-	-	≈198	≈210	≈50	≈40	≈40	≈50

APPENDIX II. - continued.

Nominal species	Middle leg								
	Coxa	Troch.	Fem.	Tib.	Tarsus				
					Total	1	2	3	4
1. *medius*	≈69	54	≈164	-	169	49	46	41	34
2. *ranalteri*	57	47	152	210	157	40	44	41	35
3. *lacensis*	≈59	≈46	≈148	-	≈168	≈41	46	41	-
4. *pectoralis*	74	53	182	239	183	47	50	50	35
5. *wolfsthali*	-	-	186	271	195	65	47	46	42
6. *hundsheimensis*	69	44	148	194	138	36	38	36	28
7. *superadditus*	49	47	146	191	154	39	34	41	32
8. *intermedius*	≈64	46	181	239	175	48	48	43	35
9. *stubaiensis*	49	-	≈128	158	104	22	27	29	26
10. *nunezi*	83	61	222	319	213	53	58	57	46
11. *pucarobius*	-	-	-	-	167	-	-	-	-
12. *neuquenensis*	-	-	-	≈237	179	≈48	≈46	≈46	38
13. *fabarius*	-	-	≈248	≈327	≈198	≈89	≈89	≈89	≈50

APPENDIX II. - continued.

Nominal species	Hind leg								
	Coxa	Troch.	Fem.	Tib.	Tarsus				
					Total	1	2	3	4
1. *medius*	109	-	197	271	≈176	50	46	44	35
2. *ranalteri*	108	62	190	245	165	44	46	41	34
3. *lacensis*	104	57	189	-	≈170	43	48	44	27
4. *pectoralis*	118	74	181	279	192	40	48	47	34
5. *wolfsthali*	-	-	-	-	≈175	46	49	43	38
6. *hundsheimensis*	97	≈53	171	212	140	35	39	37	30
7. *superadditus*	96	53	163	214	159	36	43	45	35
8. *intermedius*	108	68	212	280	181	49	50	47	35
9. *stubaiensis*	79	51	-	176	104	-	30	29	26
10. *nunezi*	127	71	278	330	222	49	64	63	46
11. *pucarobius*	118	-	229	258	165	-	-	-	-
12. *neuquenensis*	-	-	-	267	178	-	-	45	39
13. *fabarius*	-	-	-	≈337	≈218	≈50	≈59	≈50	≈40

APPENDIX II. - continued.

Nominal species	Scape + radicle		Pedicel		Funicle article (no. sensory ridges)					
					1		2		3	
	L	W	L	W	L	W	L	W	L	W
1. *medius*	-	33	57	33	28	17	70	18	78	23(2)
2. *ranalteri*	≈114	30	54	31	28	17	63	15	71	23(2)
3. *lacensis*	119	29	53	32	24	16	68	16	79	18(2)
4. *pectoralis*	118	-	56	34	29	17	69	20	74	27(2)
5. *wolfsthali*	-	35	68	32	34	16	105	17	89	19
6. *hundsheimensis*	106	28	48	25	24	13	51	15	59	21(2)
7. *superadditus*	≈92	22	43	24	22	14	60	16(1)	64	19(2)
8. *intermedius*	126	32	58	34	23	17	66	19	85	23(2)
9. *stubaiensis*	82	24	41	29	21	14	39	15	48	19(2)
10. *nunezi*	-	-	54	-	68	-	103	- (1)	105	- (1)
11. *pucarobius*	-	-	63	-	40	-	65	-	69	- (1)
12. *neuquenensis*	-	-	67	-	39	-	64	-	72	- (1)
13. *fabarius*	≈129	≈32	≈59	30	32	19	98	23(2)	104	25(2)

APPENDIX II. - continued.

Nominal species	Funicle article (no. sensory ridges)						Club			
	4		5		6		Total		1	2
	L	W	L	W	L	W	L	W	L	L
1. *medius*	75	25(2)	74	25(2)	72	25(2)	114	40(6)	n.a.	n.a
2. *ranalteri*	69	24(2)	65	24(2)	64	26(2)	113	38(6)	n.a.	n.a.
3. *lacensis*	79	24(2)	74	24(2)	67	25(2)	111	40(6)	n.a.	n.a.
4. *pectoralis*	72	30(2)	74	30(2)	66	30(2)	121	42	60(2)	59(4)
5. *wolfsthali*	76	24(1)	75	29(2)	69	29(2)	125	46	50(2)	80(4)
6. *hundsheimensis*	52	19(1)	56	22(2)	51	24(2)	95	32	38(2)	58(4)
7. *superadditus*	61	20(2)	64	21(2)	60	22(2)	113	31	49(2)	67(4)
8. *intermedius*	80	25(2)	75	27(2)	71	27(2)	120	41(6)		
9. *stubaiensis*	37	16	48	20(2)	45	22(2)	90	27	35(2)	55(4)
10. *nunezi*	92	- (1)	90	-(2)	88	-(2)	168	- (8)	n.a.	n.a.
11. *pucarobius*	71	- (1)	73	30(2)	67	32(2)	134	49(?7)	n.a.	n.a.
12. *neuquenensis*	71	- (1)	74	-(2)	66	-(2)	134	50(?7)	n.a.	n.a.
13. *fabarius*	95	26(2)	91	26(2)	≈79	≈20(2)	134	44(6)	60(2)	73(4)

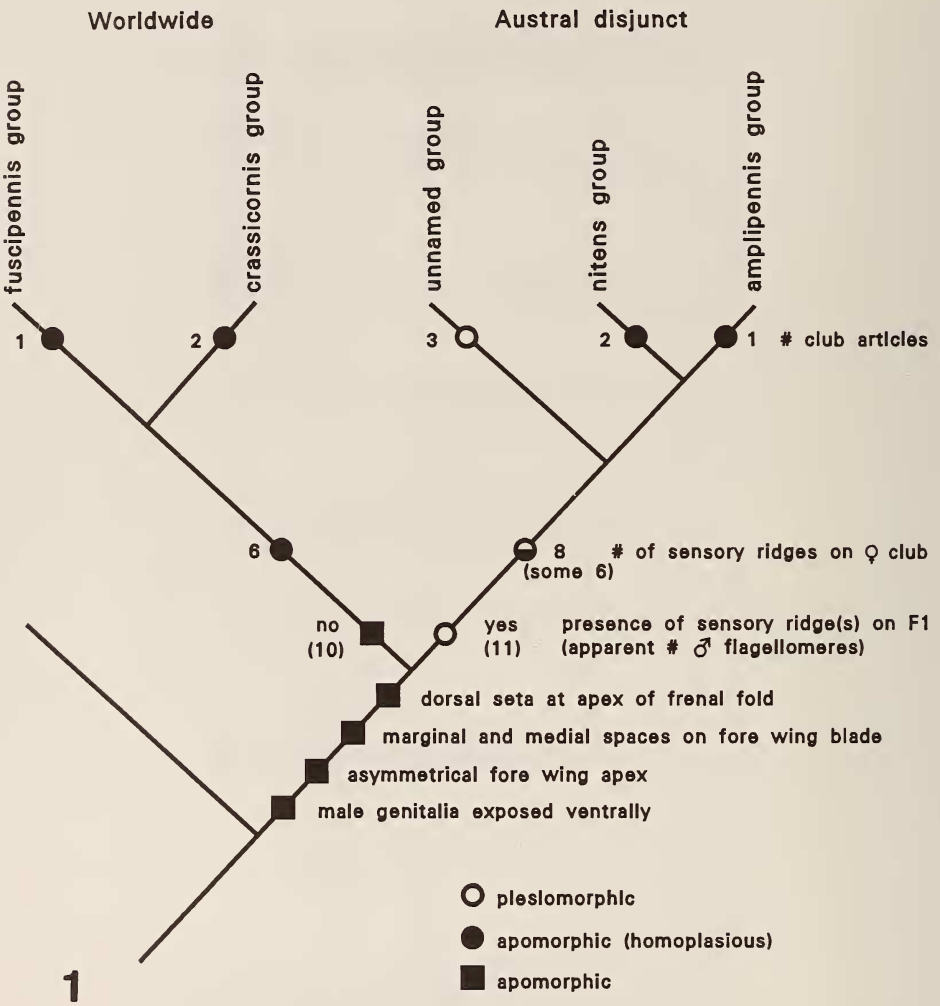
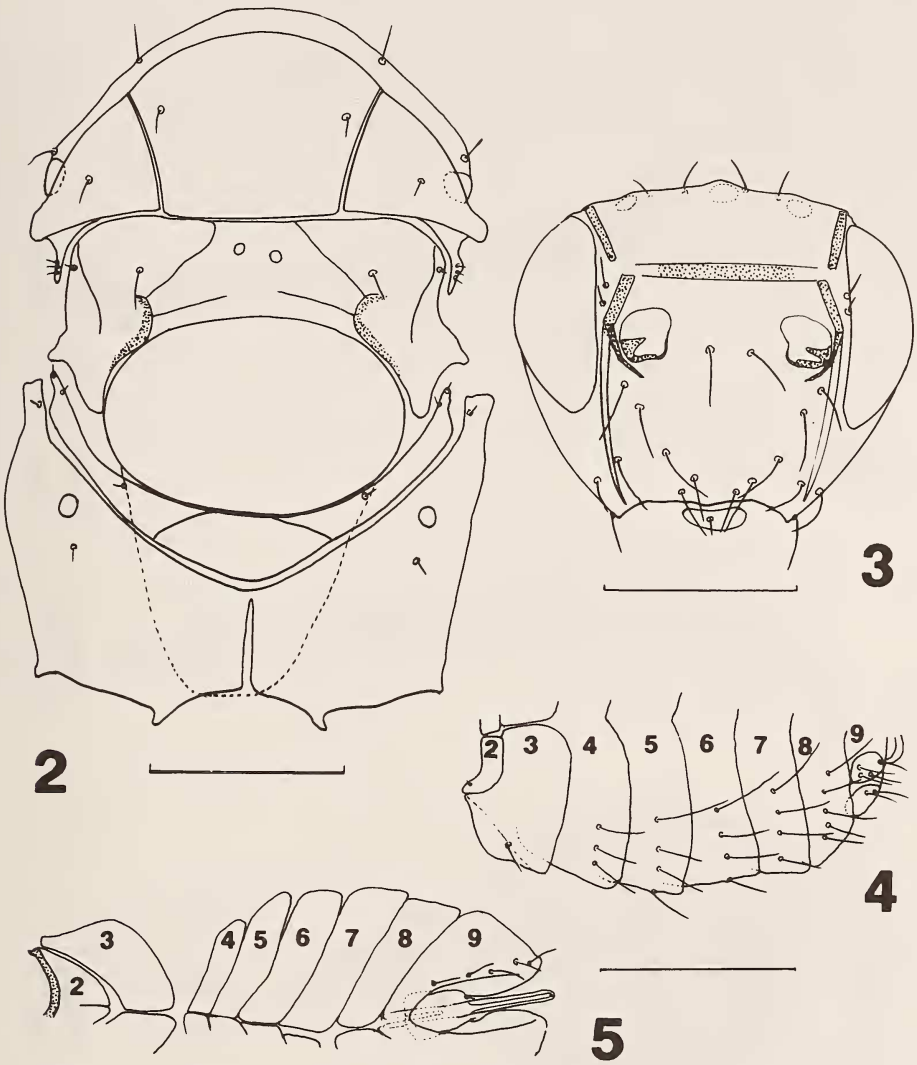
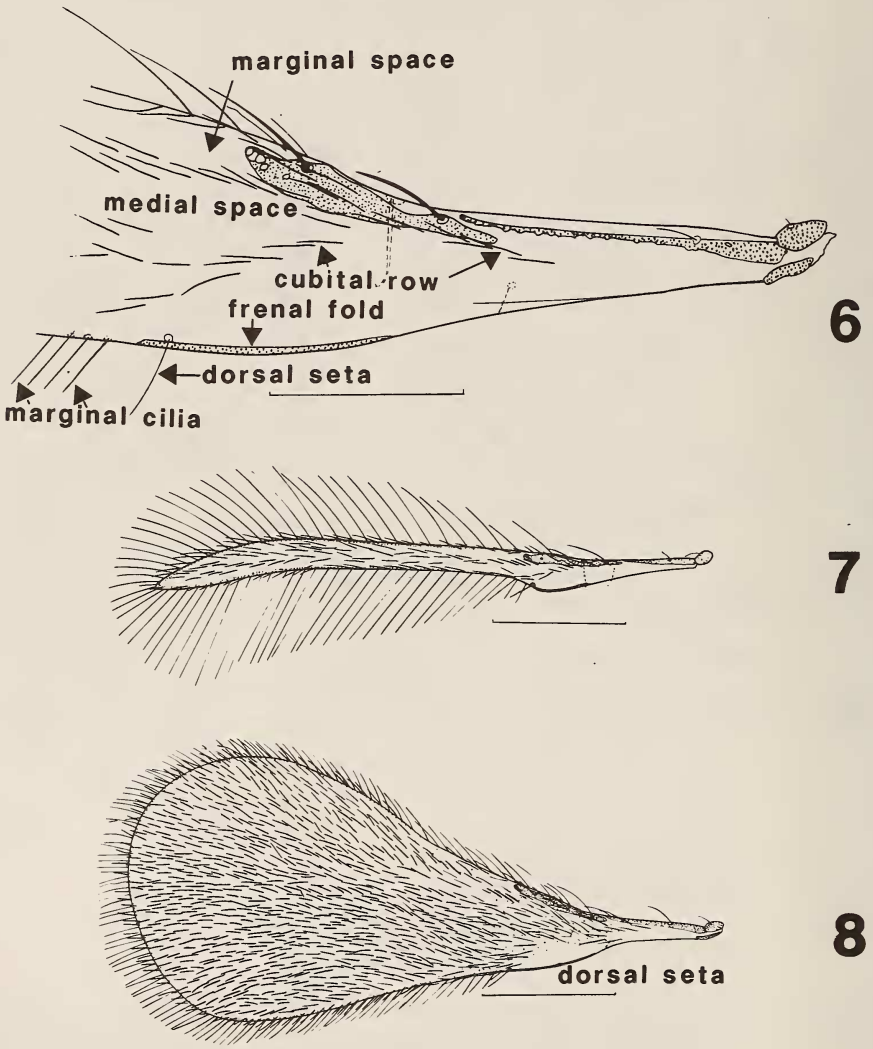


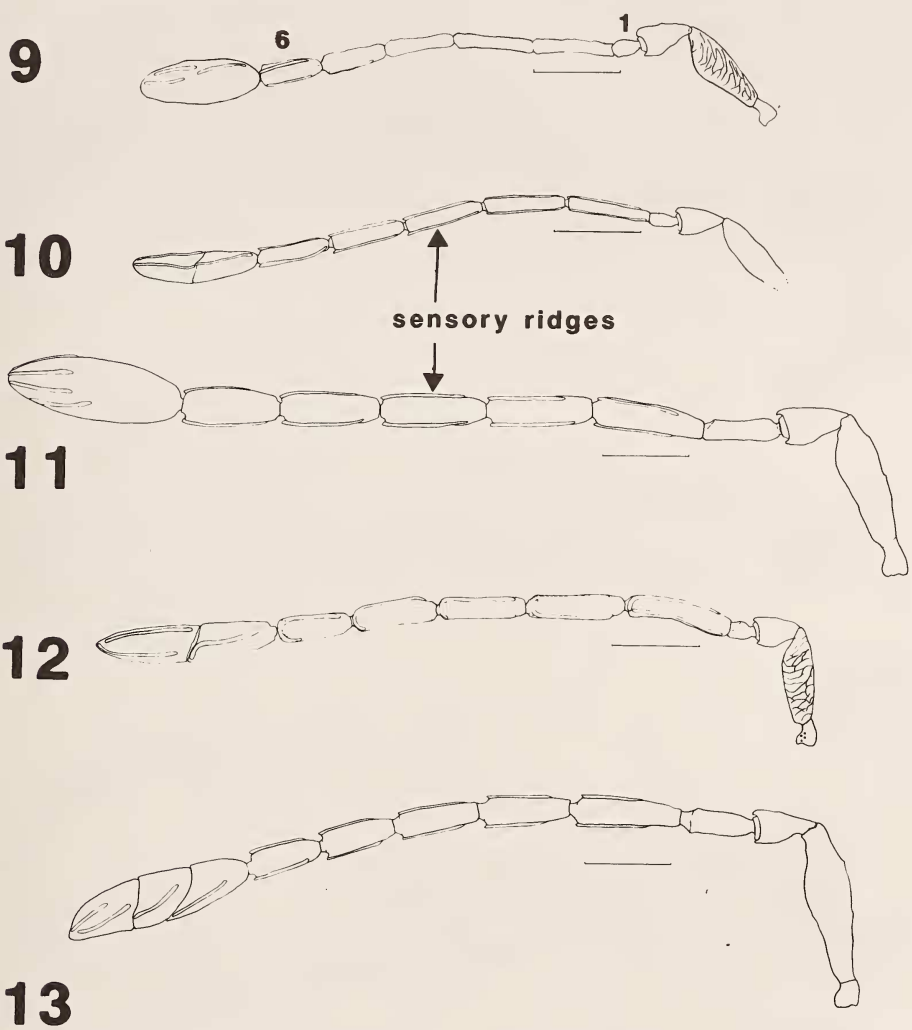
FIGURE 1. Cladogram showing relationships among species groups of *Anaphes* (Hymenoptera: Mymaridae) based on hypothesized apomorphies. See text for discussion.



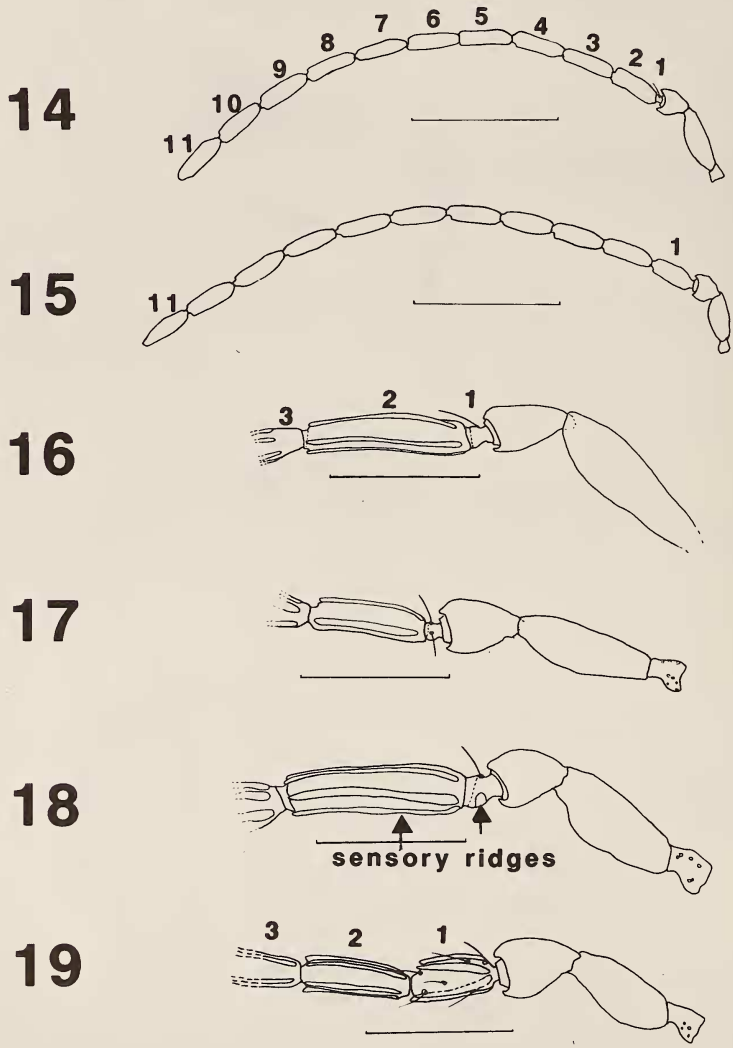
FIGURES 2-5. 2, *Anaphes fuscipennis*, mesonotum, dorsal view; 3, *Anaphes sinipennis*, head, anterior view; 4-5, *Anaphes byrrhidiphagus* allotype male, metasoma, 4, dorsal view, 5, ventral view (sternites 2 and 3 detached from remainder). Scale lines = 100 μm.



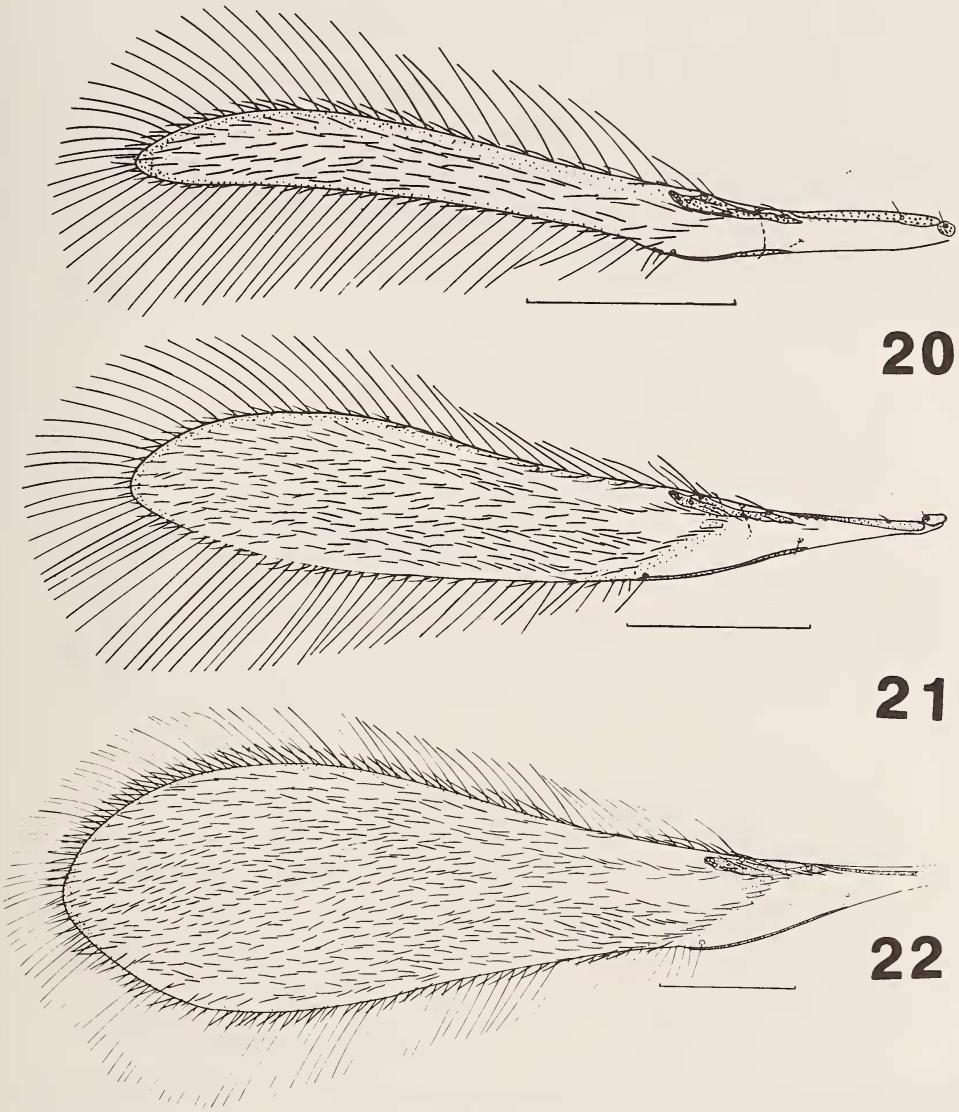
FIGURES 6-8. 6, *Anaphes fuscipennis*, base of fore wing, scale lines = 100 µm; 7-8, *Anaphes* spp. showing extremes of wing width: 7, *A.* sp. (Indonesia, Sulawesi, Utara, Dapau Mooat, Ketamobagu, V. 1985, J.S. Noyes); 8, *A.* sp. (New Zealand, AK, Titirangi, iv.1980, P.A. Maddison). Scale lines = 200 µm.



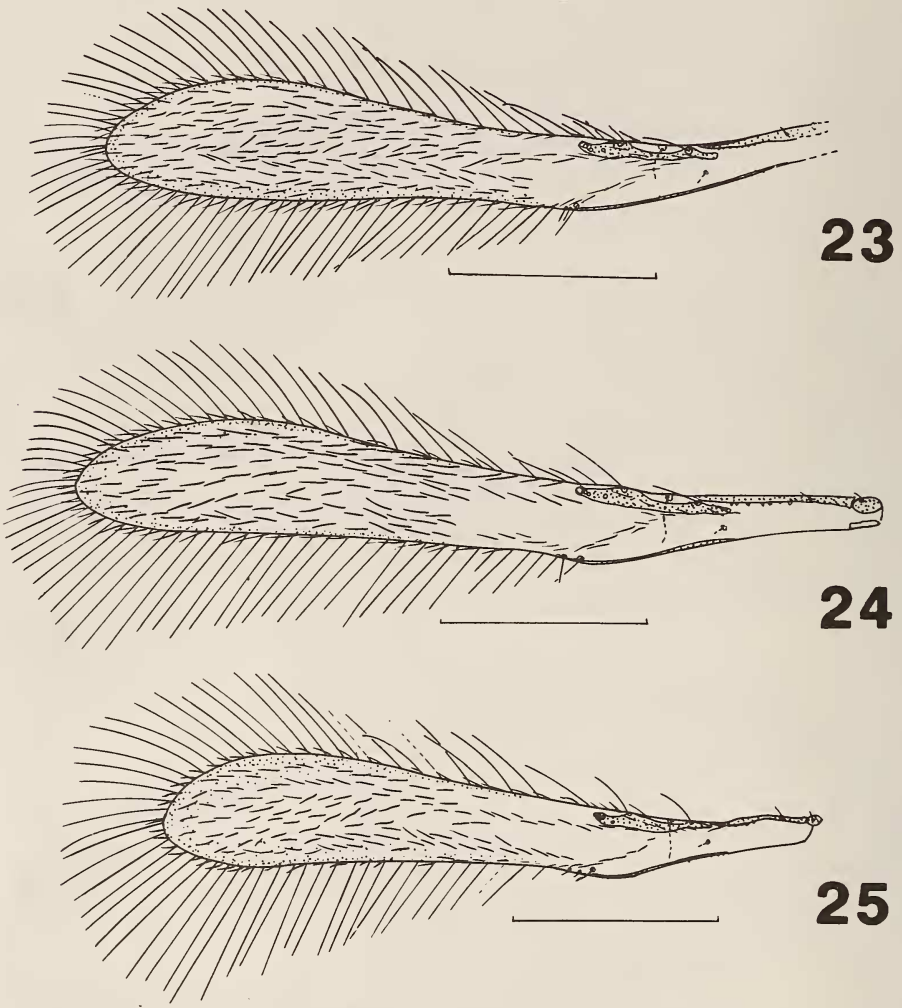
FIGURES 9-13. Female antennae of species from each species group of *Anaphes*: 9, *fuscipennis* group (*A. fuscipennis*); 10, *crassicornis* group (*A. acutiventris* Soyka, holotype); 11, *amplipennis* group (*A.* sp. ex. Chile, Aisen, 16 mi NW Cisnes Medio Rio Grande, 30.xii.1984-28.i.1985); 12, *nitens* group (*A. nitens*); 13, unnamed group (*A.* sp., New Zealand, Hokitika, Lake Mahinapua Res., 26-30.i.1978). Scale lines = 100 µm.



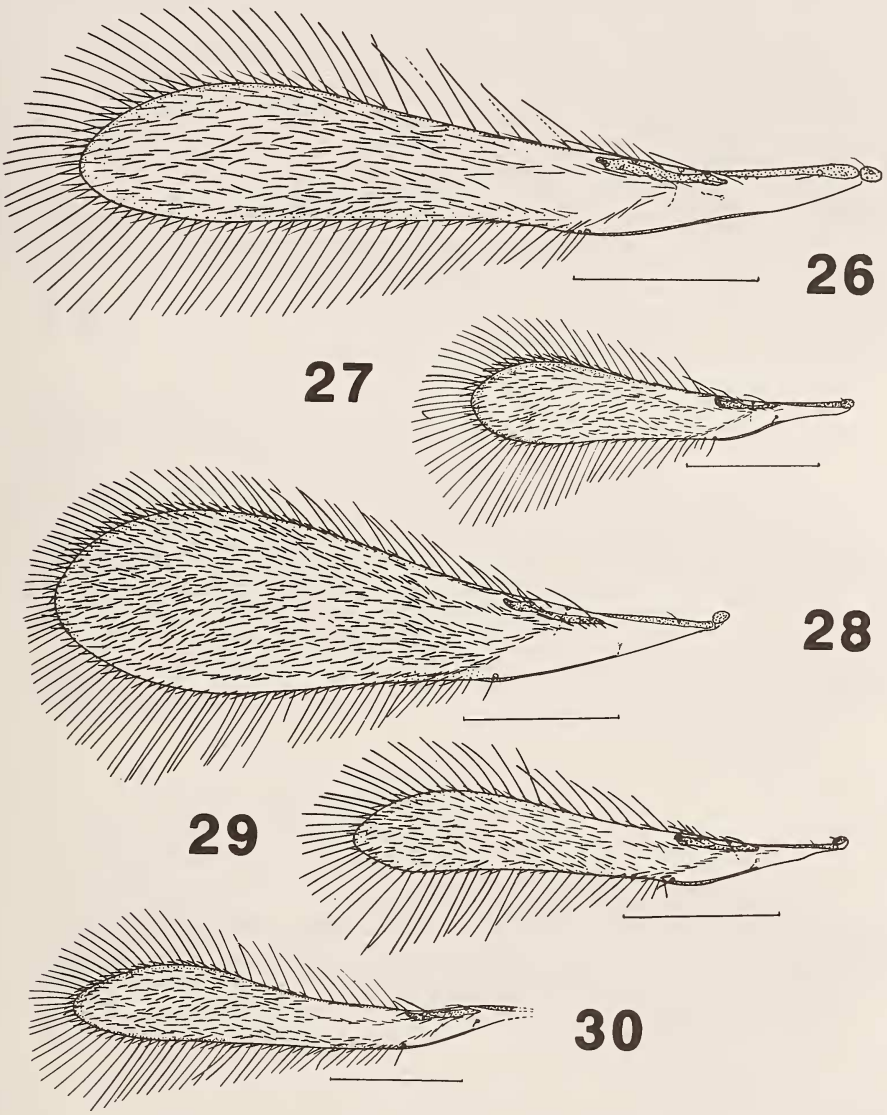
FIGURES 14-19. Male antennae of *Anaphes* spp.: 14, *A.* (*Anaphes*) *flavipes*; 15, *A.* (*Yungaburra*) sp. (Australia, New England National Park, 13.II.1984, L. Masner), scale lines = 200 µm; 16-19, basal segments of male antennae (scape to base of flagellomere 3): 16, *A.* (*Anaphes*) *acutiventris* Soyka; 17, *A.* (*Anaphes*) *fuscipennis*; 18, *A.* (*Yungaburra*) *nitens*; 19, *A.* (*Yungaburra*) sp. (*amplipennis* group, Chile, Princessa, 16.II.1985). Scale lines = 100 µm.



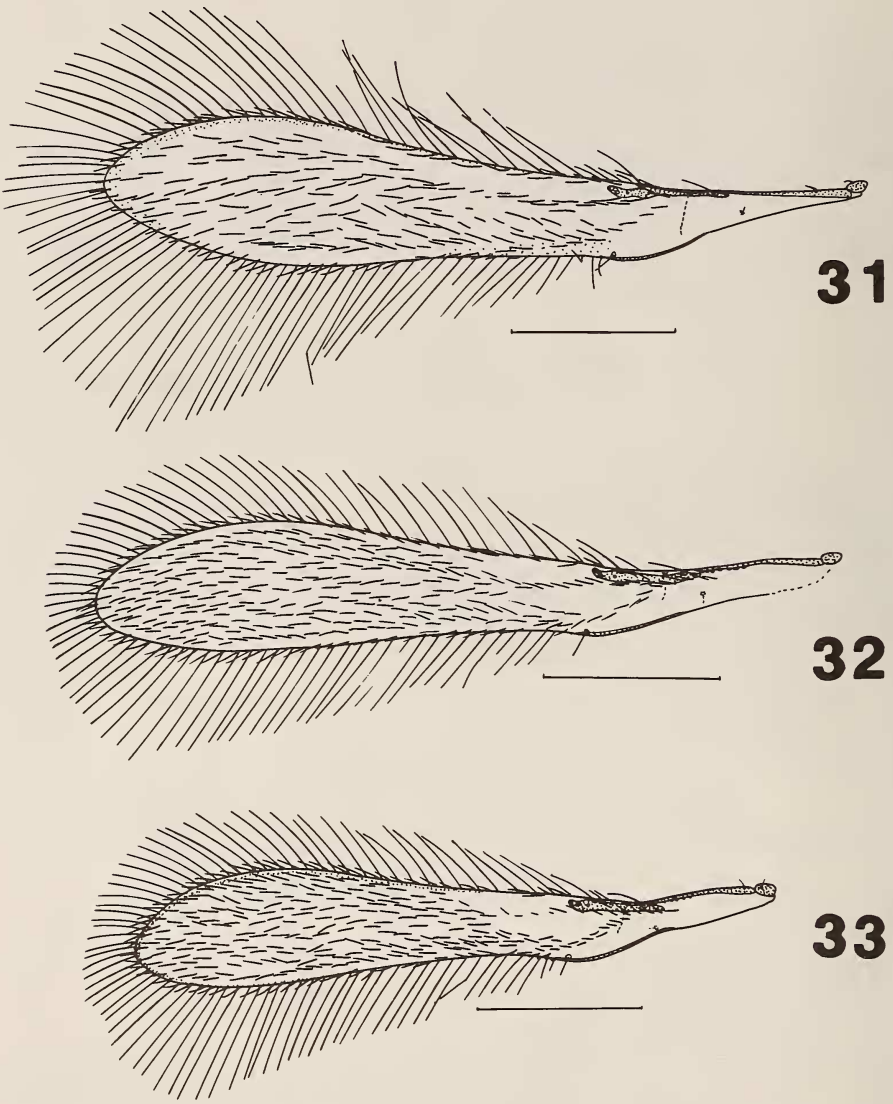
FIGURES 20-22. Fore wings of North American *Anaphes* spp.: 20, *A. sinipennis*; 21, *A. fuscipennis*; 22, *A. byrrhidiphagus*, holotype. Scale lines = 200 µm.



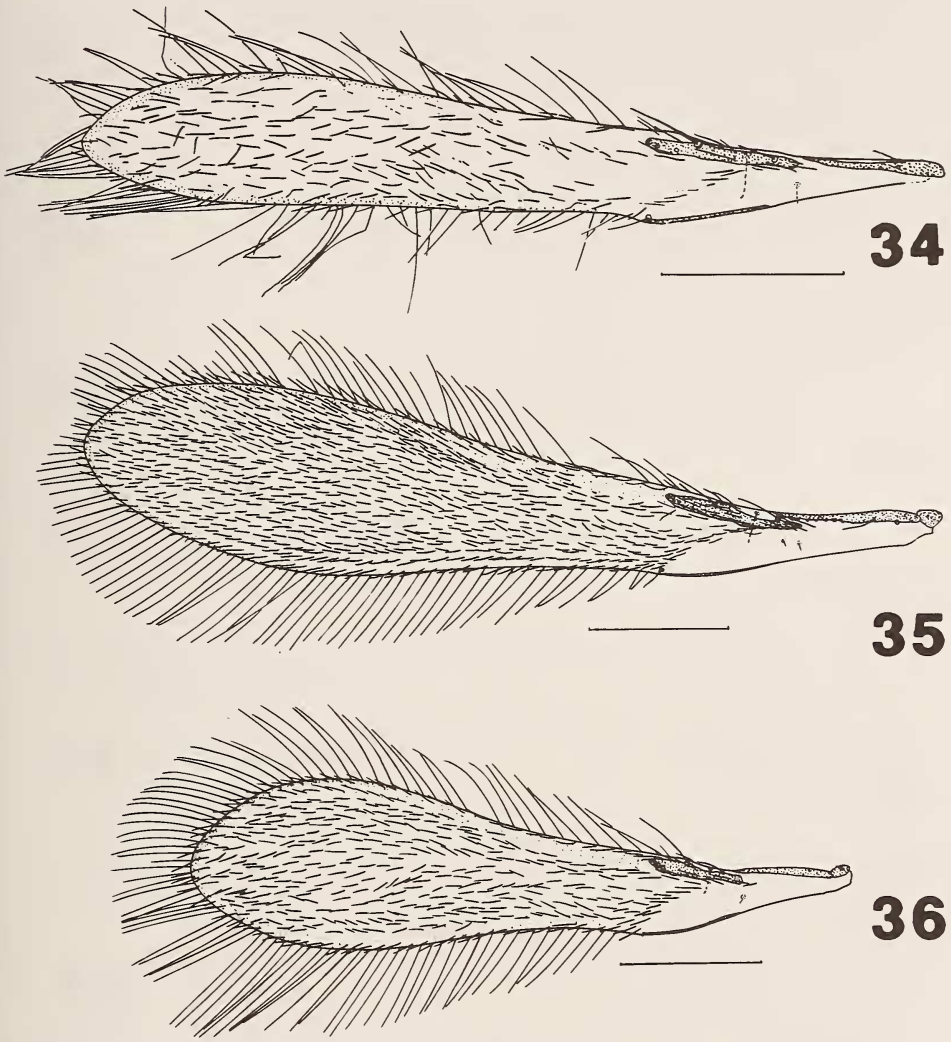
FIGURES 23-25. Fore wings of North American *Anaphes* spp.: 23, *A. nigrellus*, holotype; 24, *A. flavipes*, ex lab. culture from Niles, MI; 25, *A. behmani*, paralectotype. Scale lines = 200 µm.



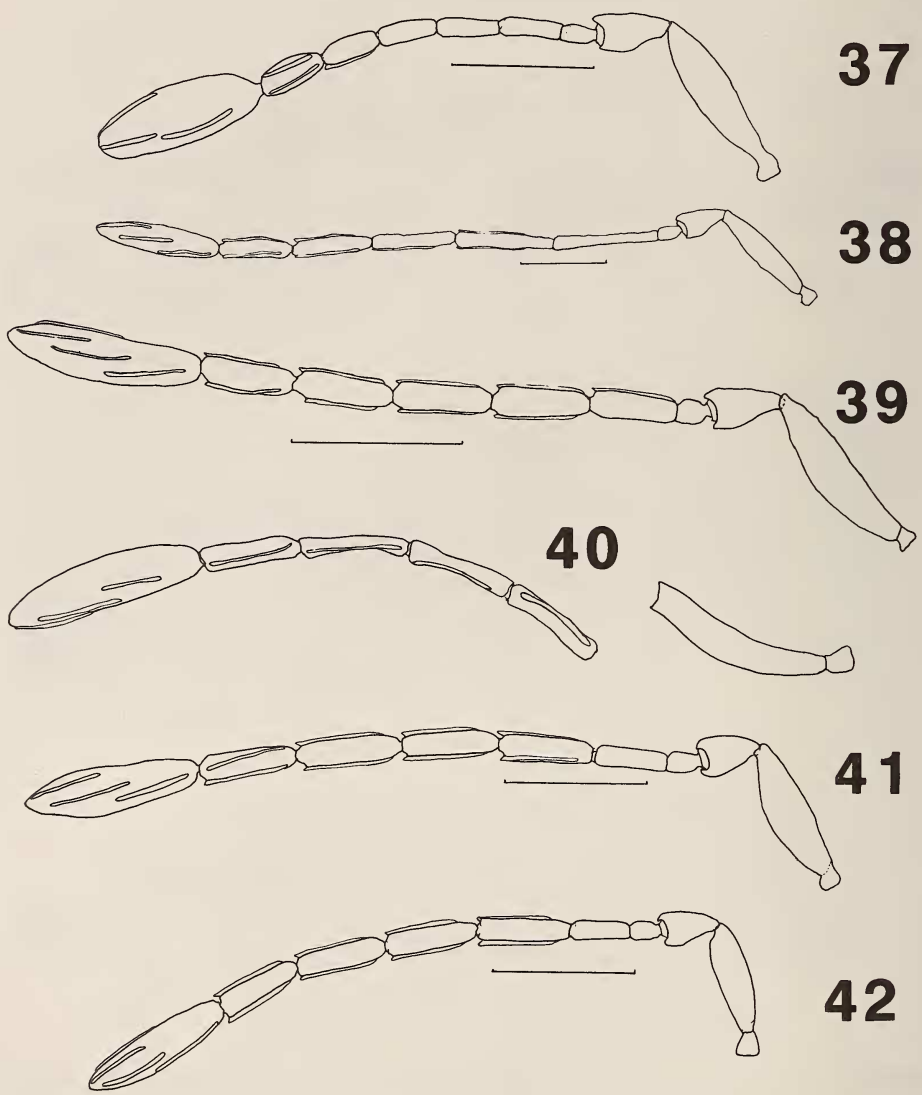
FIGURES 26-30. Fore wings of North American *Anaphes* and type species of various generic synonyms of *Anaphes*: 26, *A. hercules*, holotype; 27, *A. stubaiensis* (*Antoniella*), holotype; 28, *A. pectoralis* (*Hofenederia*), lectotype; 29, *A. hundsheimensis* (*Fulmekiella*), holotype; 30, *A. superadditus* (*Mariella*), holotype. Scale lines = 200 µm.



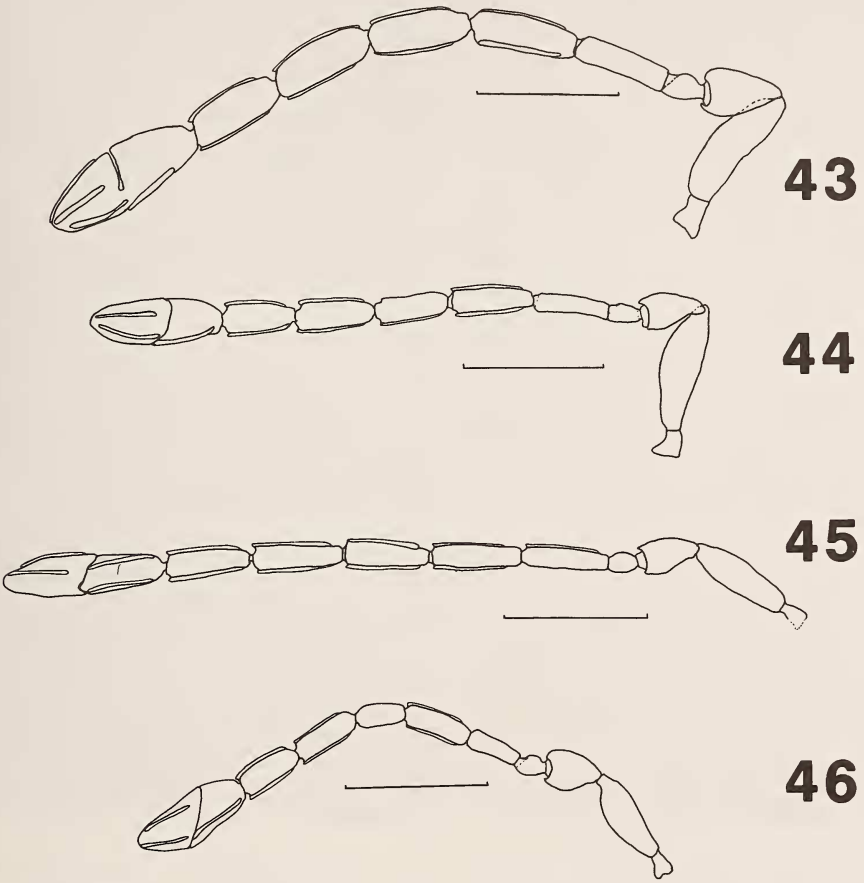
FIGURES 31-33. Fore wings of type species (except *A. ranalteri*) of various generic synomyms of *Anaphes*: 31, *A. wolfsthali* (*Stammeriella*), holotype; 32, *A. intermedia* (*Ferrierella*), holotype; 33, *A. ranalteri* (syn. of *A. medius*) (*Synanaphes*). Scale lines = 200 µm.



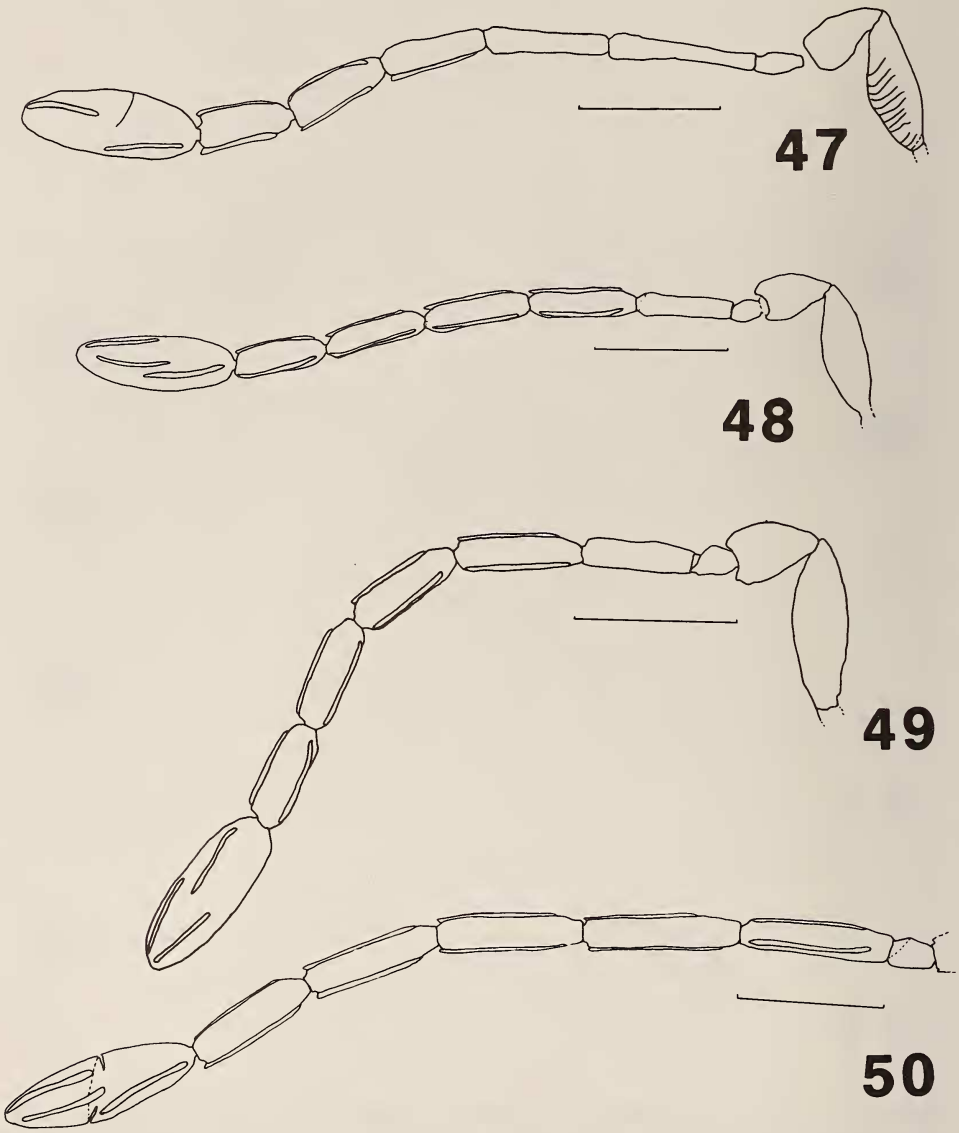
FIGURES 34-36. Fore wings of generic synomyms of *Anaphes* (*Anaphes*) and *Anaphes* (*Yungaburra*), *amplipennis* group: 34, *A. fabarius* (*Flabrinus*), lectotype; 35, *A. nunezi*, holotype; 36, *A. pucarobius*, holotype. Scale lines = 200 µm.



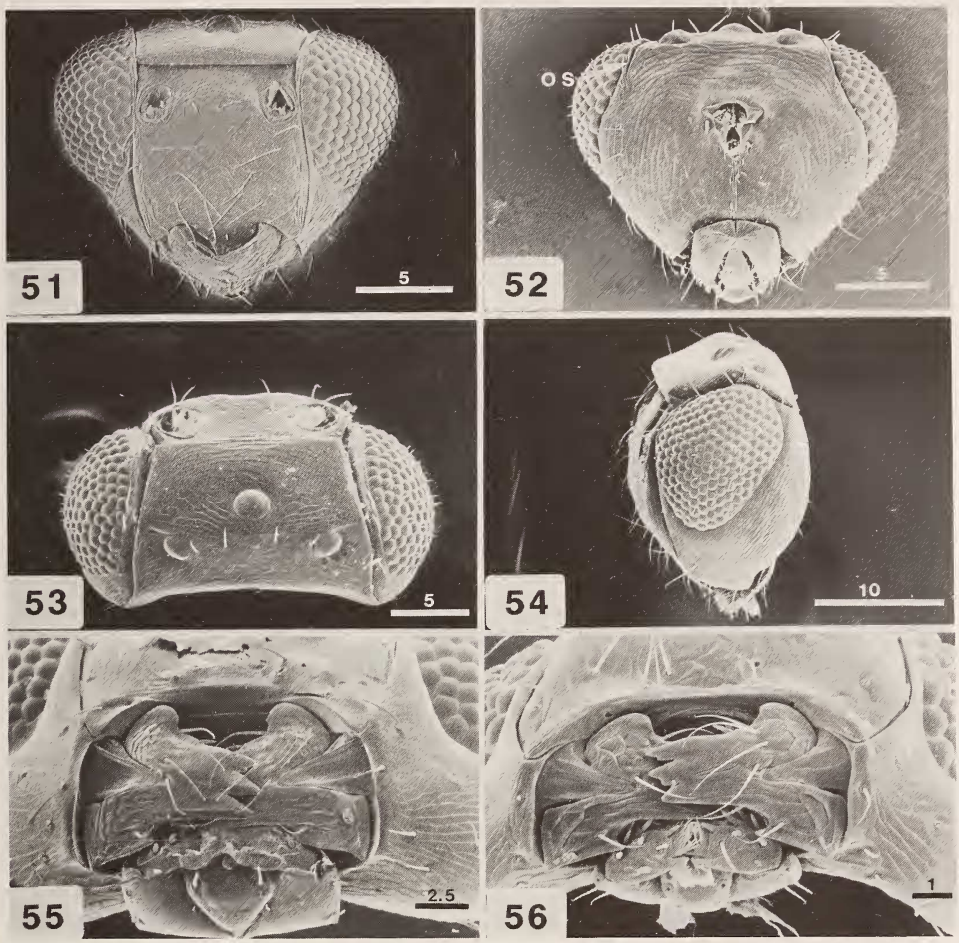
FIGURES 37-42. Female antennae of North American *Anaphes* spp.: 37, *A. sinipennis*; 38, *A. byrrhidiphagus*, holotype; 39, *A. nigrellus*, holotype; 40, *A. hercules*, holotype (scape in dorsal view, flagellomeres 1 and 2 not clearly visible; excluded); 41, *A. flavipes*, ex lab. culture from Niles, MI); 42, *A. behmani*, paralectotype. Scale lines = 100 µm.



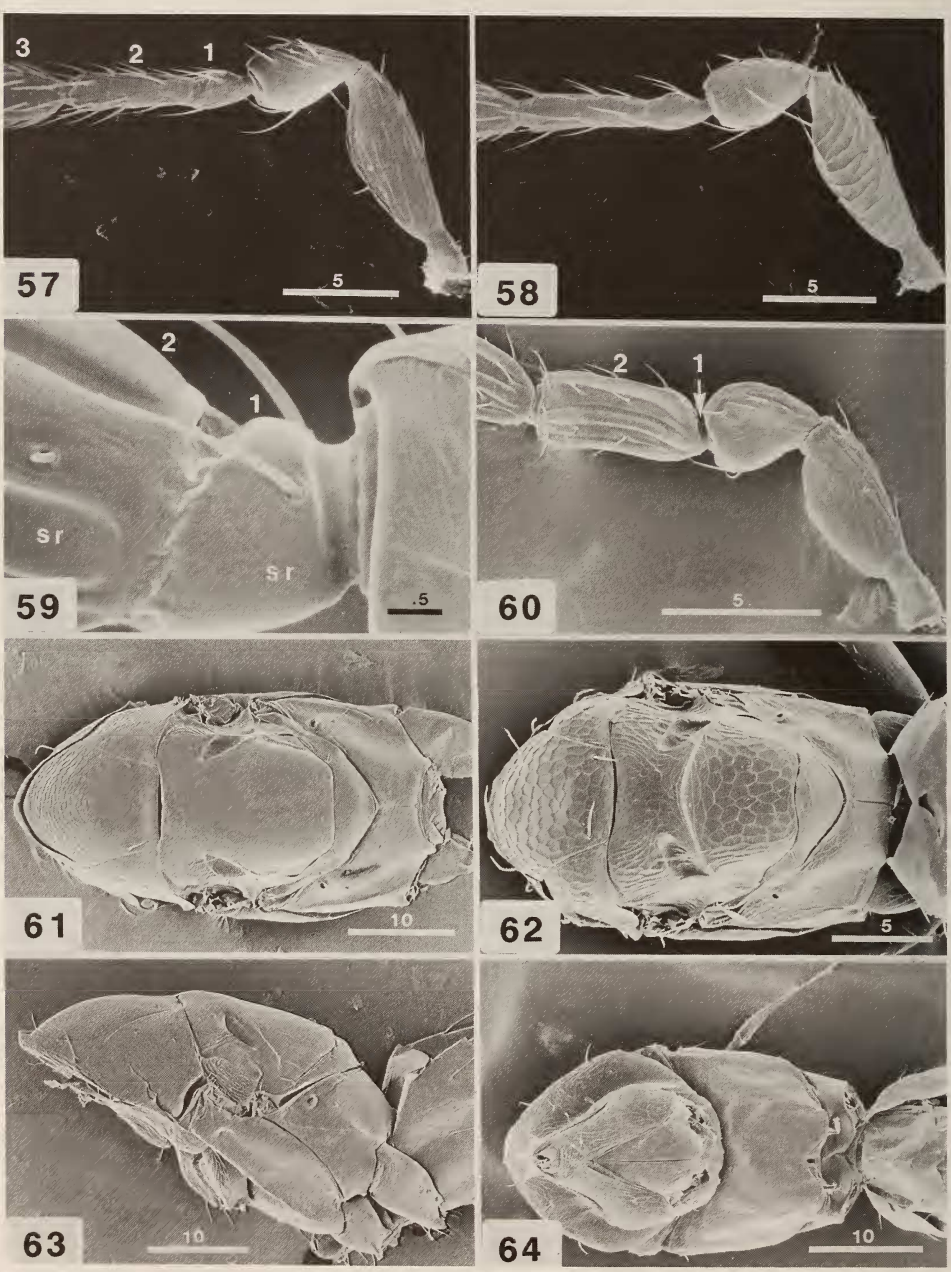
FIGURES 43-46. Female antennae of type species of various generic synomyms of *Anaphes*: 43, *A. pectoralis* (*Hofenederia*), lectotype; 44, *A. hundsheimensis* (*Fulmekiella*), holotype; 45, *A. superadditus* (*Mariella*), holotype; 46, *A. stubaiensis* (*Antoniella*), holotype. Scale lines = 100 µm.



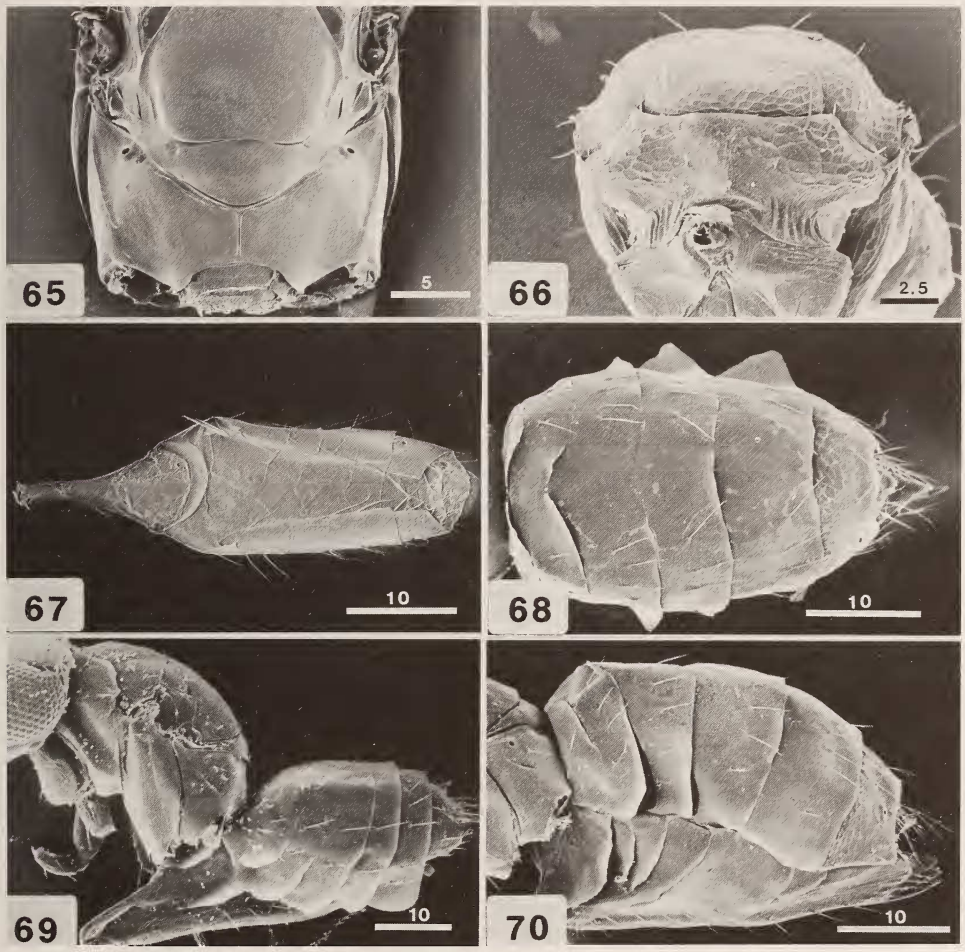
FIGURES 47-50. Female antennae of type species of various generic synomyms of *Anaphes*; 47, *A. wolfsthali* (*Stammeriella*), holotype; 48, *A. intermedia* (*Ferrierella*), holotype; 49, *A. medius* (*Synanaphes*) 50, *A. fabarius* (*Flabrinus*), lectotype. Scale lines = 100 µm.



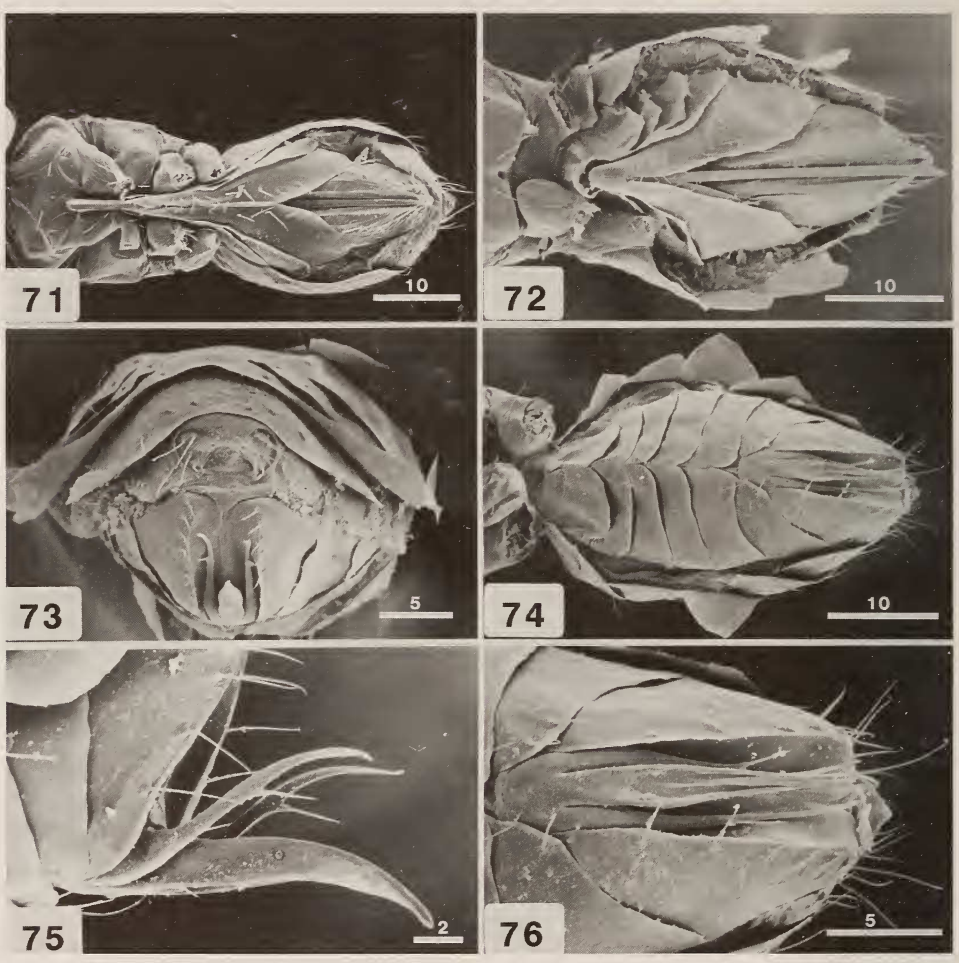
FIGURES 51-56. *Anaphes* spp.: 51, *A.* sp. (Indonesia, Sulawesi, Utara, Dapau Mooat, Ketamobagu, V. 1985, J.S. Noyes) head, anterior view; 52, head, posterior view (os = occipital suture); 53, *A. sordidatus* head, dorsal view; 54, *A. iole* head, lateral view; 55, *A. nitens* (Girault), mouthparts; 56, *A. diana* Girault, mouthparts. Scale lines x 10 µm.



FIGURES 57-64. *Anaphes* spp., female scape-base of F3: 57, *A.* ?*conotracheli* Girault, outer view, 58, *A.* ?*conotracheli*, inner view; 59, *A. nitens* (Girault), male apex of pedicel-base of F2 (sr = sensory ridge); 60, *A. iole* Girault, male scape-base of F3, outer view; 61, *A. nitens* (Girault) mesosoma, dorsal view; 62, *A.* sp. (ex. Sulawesi) mesosoma, dorsal view; 63, *A. nitens* (Girault) mesosoma, lateral view ; 64, *A. iole*, male mesosoma, ventral view. Scale lines x 10 µm.



FIGURES 65-70. *Anaphes* spp.: 65, *A. nitens* scutellum - propodeum, dorsal view; 66, *A.* sp. (ex. Sulawesi) mesosoma, anterior view; 67, *A. nitens* metasoma (collapsed), dorsal view; 68, *A. iole* female metasoma, dorsal; 69, *A. sordidatus*, female mesosoma + metasoma, lateral view; 70, *A. iole* female metasoma, lateral view. Scale lines x 10 µm.



FIGURES 71-76. *Anaphes* spp.: 71, *A.* ?*conotracheli*, female mesosoma + metasoma, ventral view; 72, *A. iole* female metasoma, ventral view; 73, *A. iole* male metasoma, posterior view; 74, *A. iole* male metasoma, ventral view, 75; *A. iole* male genitalia, lateral view; 76, *A. iole* male genitalia, ventral view. Scale lines x 10 µm.